User Manual
Orion for Clubs
Orion at Home

Shooter's Technology LLC

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Version 2.3.22

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Chapter 1

Safety First

Safety Rules for Air Rifle Ranges

[1] The most important rules to follow in any range or target shooting activity are safety rules. This applies equally for air rifles as well as for all other types of firearms. These air rifle safety rules must be enforced at all shooting ranges by competition officials and coaches and followed by all shooters. All competitors, coaches and competition officials must know and conscientiously enforce these rules.

1. **MUZZLE** Always keep rifle muzzles pointed in a safe direction. Rifle muzzles must never be pointed at other persons under any circumstances. On a range, the safest direction to point a rifle muzzle is usually up, or downrange towards the targets.

2. **CLEAR BARREL INDICATOR (CBI)** Clear Barrel Indicators or CBIs are synthetic monofilament cords (0.065 0.095 dia.) in fluorescent orange or a similar bright color that are inserted into the bores of air rifles so that the ends of the CBI protrude out of both the muzzle and open breech. CBIs confirm that air rifles are unloaded. CBIs must be inserted in all air rifles when they are brought to a range or removed from a gun case on a range. CBIs may be removed only during preparation periods, change-over periods and firing times. The use of CBIs is mandatory in all Three-Position Air Rifle competitions.

3. **RIFLE ACTION** Always keep rifle actions open, with a CBI inserted, except when the rifle is on the firing line between the beginning of the preparation period and the end of the firing period. When firing is finished or the rifle is laid down for any reason, the action must be opened and a CBI inserted in the bore. Spring-air rifles must be left uncocked and unloaded. The action may be closed when an air rifle is placed in a gun case, but the action must be opened and a CBI inserted when it is removed from the case. Note: The only exception to this rule is for older spring-air rifles where the cocking lever cannot be left in the open position without damaging the mechanism.

[1] The Safety Rules for Air Rifle Ranges is reprinted with permission from the National Three-Position Air Rifle Council

4. **TRIGGER** Keep your finger off of the trigger until after placing the rifle in the shooting position and beginning to aim at the target. It is especially important to keep the finger outside of the trigger guard when loading the rifle and when lifting it up into position.

5. **RANGE OFFICER** A Range Officer is in charge of firing on every range. The commands and instructions of the Range Officer or person in charge of firing must be obeyed. Range Officers must check rifles brought to the range to be sure actions are open and CBIs inserted. When shooting is finished, range officers must check rifles to be sure actions are open and CBIs inserted.

6. **GROUNDED RIFLES** Whenever a Range Officer authorizes you to take your equipment and air rifles to the firing line, ground or bench your rifle on the firing point, with the CBI inserted. Do not pick up the rifle again until the Range Officer authorizes you to handle rifles or announces the start of the preparation period. Then you may pick up your rifle, remove the CBI, get into a firing position with it and dry fire (if your air rifle can be dry fired). When you finish firing, open the action, insert a CBI and ground or bench your rifle on the firing line. Leave the rifle grounded on your firing point until the Range Officer instructs you to remove it or pick it up for the change-over period prior to a new stage of firing.

7. **GUN CASES** Many air rifles are transported to and from ranges in gun cases. The Range Officer on any range will determine whether shooters may open gun cases and remove air rifles from them or replace air rifles in them behind the firing line or whether this may only be done on the firing line. When a gun case is opened, the first thing that must be done is to open the action and insert a CBI. When an air rifle is replaced in a gun case, the CBI may be removed, the action closed and the trigger released before closing the gun case.

8. **RANGE COMMANDS** Know the range commands that are used in Three-Position Air Rifle shooting. No shooter may load a pellet in an air rifle until after the command LOAD is given. No shooter may fire a shot until after the command START is given. When the command STOP is given, no further attempt to fire a shot may be made; the rifle must be taken down immediately and the action must be opened. If a pellet remains in the rifle, ask the range officer for instructions.

9. **LOADING** Rifle muzzles must remain pointed downrange or up towards the ceiling whenever the rifle is charged and loaded. Special care must be taken during charging and loading to ensure that a rifle muzzle is never pointed at a neighboring shooter or at any area behind the firing line.

10. **TARGET** Shoot only at the target designated for you. Be sure the target is properly placed in front of a safe backstop. Shooting at any object on a range besides your own target is strictly forbidden.

11. **GOING DOWN RANGE** Whenever it is necessary for anyone to go down range to hang or retrieve targets or for any other purpose, all air rifle actions must be open

with CBIs inserted and all rifles must be grounded on the floor or shooting bench. No one may go down range until authorized to do so by the Range Officer. No one may handle rifles while anyone is downrange.

12. **EYE PROTECTION** Eye protection is recommended for air rifle shooting especially if there is any possibility of a pellet or pellet fragment bouncing back from the backstop. Eye and/or hearing protection may be required on some ranges.

13. **TREAT EVERY RIFLE AS IF IT WERE LOADED** Even if you are sure your rifle is unloaded and it has a CBI inserted and even if a Range Officer has checked your rifle; treat it as if it were loaded at all times. Always be sure it is never pointed at another person. Remember the first rule of gun safety, keep the muzzle under control and pointed in a safe direction!

Chapter 2

What's New

This chapter lists recent improvements to Orion and updates to this User Manual.

Changes to version 2.3.22

- Adds the Welcome Screen at software start up. Visit Welcome Screen (section 5.1) for more information.
- Adds feature to save "Match Favorites" preconfigured matches that can easily be recreated later. Visit Match Favorites (section 5.2.7) for more information.
- Improves offline responsiveness.

Changes to version 2.3.21

Version 2.3.21 was a bug fix release.

Changes to version 2.3.20

- Adds support for the Canon DR-C240. Visit Canon DR-C240 (section 3.7.1.3) for more information.
- Added support for ATA and NSSA Trap and Skeet.
- Added "PPP Teams" category for the PPP rulebook.
- Upgrades to .NET framework 4.5.1.
- Removed support for National Match Air Rifle, 200yd. and 600yd. targets reduced for 10m.

Changes to version 2.3.19

- Added support for Finals in Trap, Double Trap, and Skeet under the USA Shooting rulebook.
- Added scorer's instructions for using Orion Scorecards. Visit Using Orion Scorecards (Appendix B) for more information.

Changes to version 2.3.18

Version 2.3.18 was a bug fix release.

Changes to Version 2.3.17

- Added support for text based competitor numbers. Visit Text Based Competitor Numbers (section 5.8.1) for more information.
- Added support for the BB Gun Practice taget. Visit Targets Schemes (table 3.2) for more information.
- Added support for the 6 Athlete Shotgun Scorecard. Visit Targets Schemes (table 3.2) for more information.
- Added support for shoot offs in Trap, Double Trap, and Skeet under the USA Shooting rulebook.

Changes to Version 2.3.16

- Added Auto-Score performance selection. Visit Auto-Score Performance (section 6.2.4) for more information.
- Added markings to Individual Score Sheet indicating shots that have been manually modified. Visit Interpreting Scores Reported by Orion (section 7.4) for more information.

Changes to version 2.3.13 - 2.3.15

Version 2.3.13 through 2.3.16 were bug fix releases.

Changes to Version 2.3.12

- Added reentry capability. Visit Reentry (section 5.2.1.6) and Working with Reentry (section 6.5) for more information.

Changes to Version 2.3.11

- Added a Shooter Database score history export.
- Added a "2x10" and "2x20" course of fire under the National Three-Position Air Rifle Council rulebook.
- Changed the "Training" course of fire, under the National Three-Position Air Rifle Council rulebook from a 3 x 60 to a 3 x 80.

Changes to Version 2.3.10

- Added an Essential Data File export, and modified how Ranked Result Data Files are generated. Visit Exporting Results as Data Files (section 7.5) for more information.

Changes to Version 2.3.8 and 2.3.9

Version 2.3.8 and 2.3.9 were bug fix releases.

Changes to Version 2.3.7

- Performance and memory management improvements.
- Usability improvements.

Changes to Version 2.3.6

Version 2.3.6 was a bug fix releases.

Changes to Version 2.3.5

- Adds "Max Number of Team Members" property, which limits the number of athletes that may be assigned to any one team. Visit Course of Fire Tab (section 5.2.2) for more information.

Changes to Version 2.3.3 and 2.3.4

Version 2.3.3 and 2.3.4 were bug fix releases.

Changes to Version 2.3.2

- Adds support for *Team Leagues*. A Team League allows a series of teams to compete against each other, over a number of weeks, in a win-loss basis. The winner of the League is the team with the best record. Visit Team Leagues (section 8.4) for more information.

- Adds support for a 12 bull BB Gun target (B4 Paper Size) and the Basic Marksmanship Course target. Visit Targets Schemes (table 3.2) for more information.
- Improve scoring algorithm for Benchrest. With this change protests are disabled and scoring multiple shots per bull is disabled in Benchrest matches.

Changes to Version 2.3.1

Version 2.3.1 was a bug fix release.

Changes to Version 2.3.0

- Updates Orion's scoring algorithm. With this update calibration is no longer necessary and the DR-C225 scanner will score BB Gun targets.
- Adds support for *Tournaments*, or a grouping of Matches online. Visit Tournaments (section 8.3) for more information.
- Adds support for the Canon DR-M160II. Visit Canon DR-M160 (section 3.7.1.4) for more information.

  If you are using a non-supported scanner please visit Scanner Shadows Section 6.2.7 for more information.

Changes to Version 2.2.35

Version 2.2.35 was a bug fix release.

Changes to Version 2.2.34

- Added support for using barcode labels with scorecards. Visit Barcode Labels on Scorecards (section 5.8.2.4) for more information.
- Added support for the new letter size (8.5in by 11in) 12 bull Air Rifle Target, 12 bull 50ft Rifle Target, and 12 Bull 50ft Rifle - Gallery League Target. Visit Targets Schemes (table 3.2) for more information.

Changes to Version 2.2.33

Version 2.2.33 was a bug fix release.

Changes to Version 2.2.32

- Added support for the BB Gun Test Answer Sheet. Visit Scoring Tests (section 6.4.12) and Targets Schemes (table 3.2) for more information.

- Added support for the Rimfire Sporter Scorecard and `CMP Rimfire Sporter`. Visit Targets Schemes (table 3.2) and Tie Breaking Rules (section 5.2.1.4) for more information.
- Added support for the Silhouette Scorecard. Visit Targets Schemes (table 3.2)and Tie Breaking Rules (section 5.2.1.4) for more information.
- Added support for the Shotgun Scorecard. Visit Targets Schemes (table 3.2)and Tie Breaking Rules (section 5.2.1.4) for more information.
- Added support for the Canon DR-C225 scanner. Visit Supported Scanners (section 3.7.1) and Canon DR-C225 (section 3.7.1.2) for more information.

Changes to Version 2.2.31

- Improves Result Center's online Scoreboard to rank athletes and teams based on average shot fired. Visit Result Center's Scoreboard (table 8.5.2) for more information.

Changes to Version 2.2.30

- Adds support for scanable scorecards. Visit Targets and Scorecards (section 3.5), Scoring Fill-in-the-Bubble Shot Selection Rows (section 6.3.1), and Shot Selection Rows (section 6.4.5) for more information.
- Adds support for High Power Rifle scorecards. Visit Targets Schemes (table 3.2) and Tie Breaking Rules (section 5.2.1.4) for more information.
- Improves Air Pistol's multi-shot scoring accuracy.

Changes to Version 2.2.29

- Adds a new license option for individual users, Orion at Home. Visit License Information (section 3.2) and Auto-Score for a Single Shooter in a Match (section 6.2.1) for more information.
- Adds support for the Canon P-208 scanner. Added support for the Canon P-208 scanner. Visit Supported Scanners (section 3.7.1) and Canon P-208 (section 3.7.1.1) for more information.

Chapter 3

Requirements

This chapter lists the hardware, software, and target requirements needed to use Orion.

3.1 Orion Software

The Orion software program is the application that is installed and runs on a Windows computer.

Orion installation files are available by download only at www.orionscoringsystem.com. Users must possess a current scoring license to install Orion. The installation files are valid for both Orion for Clubs and Orion at Home users.

For instructions on how to install Orion see the "Setup and Walk Through Guide"

3.2 License

Orion has three variations. These are named "Orion for Clubs," "Orion at Home," and "Orion Site License." Orion for Clubs and Orion Cite License are both full featured versions of Orion and only differ in the number of computers the software may be installed on. Orion at Home is meant for home users and has some limitations. Orion at Home users may join virtual matches but may not create them, are limited to four competitors per match, and teams are disabled. All all features are avaliable.

Activation of Orion requires an Orion license file. Orion customers receive their license file via email. The license file will look similar to the one shown in Figure 3.1.

The license file contains information about the owner, license expiration date, and scoring licenses possessed by the user. The long string of characters at the end of the license is a security code.

Activating Orion is accomplished using a download code. The download code is a string of six to eight capital letters. It is email to each user after purchasing an Orion system or with a license renewal. To enter the download code use the `Help` then `License` options. Type the code into the labeled box and click [Download].

Alternately, the license file can be copied and pasted exactly into the license form to activate Orion. To insert the key use the `Help` then `License` options. Copy the license

```
Erik Anderson
Shooter's Technology LLC
6/1/2011
6/1/2011
@ORION_V1
@VIS_AIR_RIFLE
@VIS_50FT_RIFLE
1234567890abcdef1234567890abcdef
```

Figure 3.1: Example license file needed to activate Orion

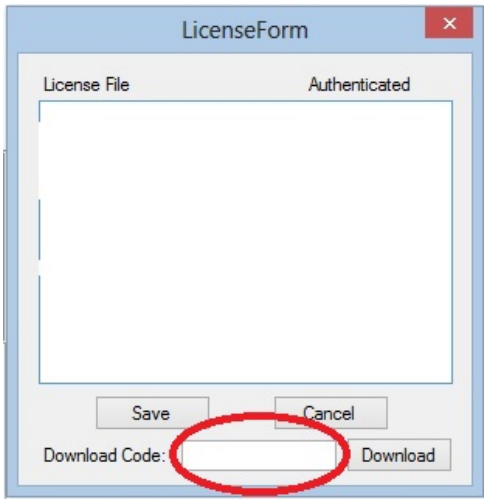


Figure 3.2: Entering the Download Code.

text into the box and hit `save`. This will activate the purchased scoring licenses.

Briefly [1] A license agreement gives provides the user with unlimited upgrades and support for the duration of the licensed term. When the license expires Orion will no longer score any new targets. However Orion will still be able to view match results from previously scored targets. Orion may be installed on a single computer.

It is prohibited for multiple users to utilize a single install license of Orion. An "User" may be an individual or organization. If an user is an organization, any representative of the organization may use the licensed copy of Orion. It is prohibited to install Orion on multiple machines or transferring Orion from one machine to another without written approval from Shooter's Technology LLC.

3.2.1 License Renewal

Orion is licensed on an annual basis. It is possible to purchase up to a three year license.

[1] This summary of the license agreement does not replace the EULA. It is provided here as a quick reference only.

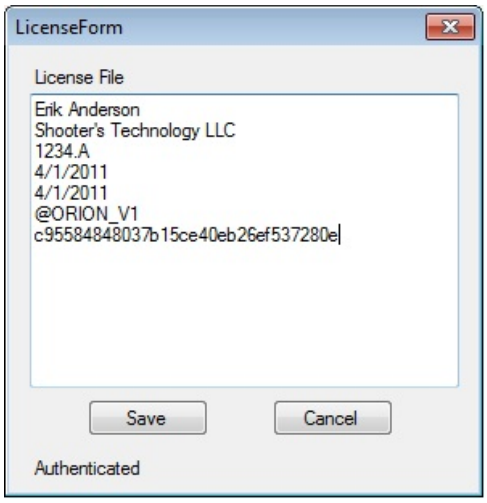


Figure 3.3: Entering the license into the License Form.

Orion will provide an alert when the license is about to expire. Once a license is within 90 days of expiration Orion will present a message box similar to Figure 3.4 when Orion is opened.

Figure 3.4: License expiration warning message.

After renewing the scoring license an updated license file will be provided by Shooter's Technology. Like the original license file this must be copied into Orion's license form to activate, by going to `Help` then `License`. The text of the old license file must be removed, and the text of the new license file must be entered in exactly as it appears in the email.

3.2.2 Non-Scoring License

Licensed Orion for Club and Site License users may request a secondary "non-scoring license" to install and run Orion on a secondary machine. This type of license may be useful, for example, on a home computer to allow match directors to enter competitor and teams into a large match.

Specification	Required	Recommended
Processor Speed	2.0GHz	3.0GHz
OS Type	32 bit	64 bit
Number of Cores	1	2
Memory	2GB	4GB
Hard Drive	150GB	300GB on a fixed hard drive

Table 3.1: Workstation Requirements and Recommendations

Contact Shooter's Technology to request a secondary non-scoring license. There is no fee for a non-scoring license.

3.3 Internet Access

Most functions of Orion do not require Internet access. However, Internet access is required to use the Result Center (see Chapter 8), or when conducting a Civilian Marksmanship Program sanctioned match and reporting scores electronically (see section 7.6).

Using the Result Center requires Internet access.

When opening Orion, the software will check for newer available versions via the Internet, if a connection is available.

The Orion installation and update files are only available as a downloadable file from www.orionscoringsystem.com.

Even though a computer may have Internet access, it is not uncommon for local firewalls to deny network access to the Orion Scoring System software. This local firewall needs to be configured to grant network access to Orion in order to utilize Orion's Internet enabled capabilities.

Some organization networks (e.g. public school networks) block Internet access to certain websites. Please verify with the appropriate network administrator that www.orionscoringsystem.c and www.orionresults.com, on port 80 and 443, are accessible via the network the computer running Orion is connected to.

3.4 Workstation

Orion runs only on Microsoft Windows Vista, 7, 8, or 10 using Micrsoft's standard builds. Both 32bit or 64bit versions of Windows are supported. The requirements and recommendations for a workstation to run Orion are listed in Table 3.1.

Windows XP is no longer supported by Orion, due to Microsoft ending support in April 2014.

3.4.1 System Date

The time and date set on your computer must be reasonablly accurate. Orion is not supported if the clock is set too far ahead or too far behind.

3.4.2 Microsoft's .NET Framework

Orion requires Microsoft's .NET Framework version 3.5. Thanks to Microsoft Update most workstations already have .NET Framework version 3.5 installed. If the Orion workstation does not have .NET 3.5 installed the Orion installation program will try to download and install it from the Internet.

Please note that later versions of the .NET Framework (e.g. .NET 4.0) does not explicitly include .NET 3.5.

3.4.3 Computer Proficiency

Orion is only recommended for users proficient with Microsoft Windows based operating systems. Users should be able to comfortably perform program installation, file management, set up external hardware (e.g. scanners and printers), and use the Internet.

3.5 Targets and Scorecards

Orion works with either designated Orion Targets, Orion Scorecards, or specific paper targets that have been approved by the ISSF.

Orion Targets and Scorecards may be purchased from www.orionscoringsystem.com and other approved vendors.

There are many attributes about Orion Targets that are unique and necessary for electronic scoring. The two most obvious attributes are the target's size and paper quality. For example, the Orion multi-bull air rifle target uses an A4 paper size. This allows the targets to be scanned using many commercial scanners with an automatic document feeder. The traditional 12 bull paper size is simply too large for economical scanners. The paper quality is also key for accurate electronic scoring.

Orion Scorecards are designed for shooting disciplines where scoring is done in the field, such as high power rifle, silhouette, or shotgun. They contain a series of fill-in-the-bubble rows. Each row representing a shot the athlete would fire in the competition. And each bubble in the row representing a possible shot value. To learn how to use Orion Scorecards, as a scorer recording scores, visit Appendix B.

3.5.1 ISSF Approved Air Rifle and Air Pistol Targets

Single bull air rifle and air pistol targets approved by the ISSF may also be used with Orion.

- The Orion Air Pistol scoring technology will score either Orion Air Pistol targets or any ISSF approved Air Pistol target measuring 17cm by 17cm.

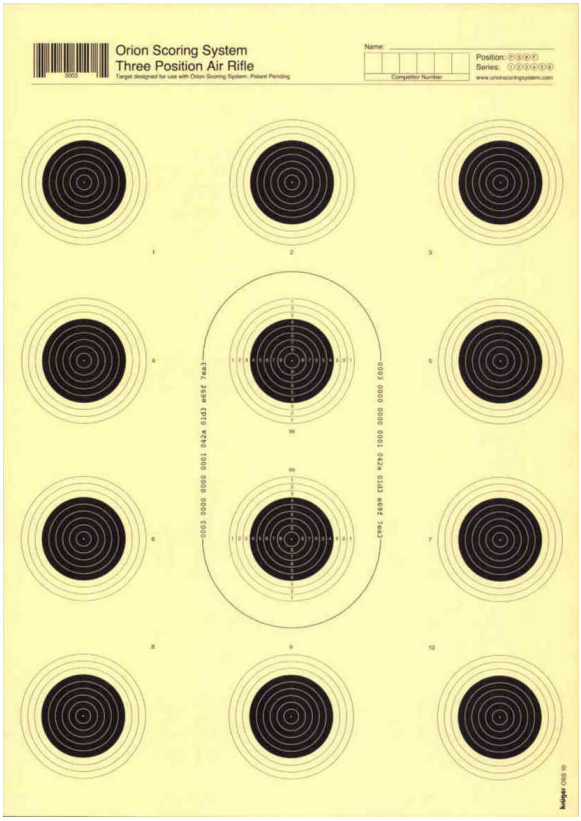


Figure 3.5: An approved Air Rifle Target for Orion

- The Orion Air Rifle scoring technology will score any Orion Air Rifle target or any (single bull) ISSF approved Air Rifle target measuring 10cm by 10cm.

3.5.2 Protecting Targets from Rain and Wind

When using Orion Targets care must be taken to protect the target from rain, wind, and other weather. Orion targets tear easily, especially when wet. They are not designed to be scanned and scored when wet. If a target does get wet it is important to dry the target throughly before scanning the target.

3.5.3 Target Scheme

A "Target Scheme" is the formal name used by Orion to define a particular type of target or scorecard. More precisely a target scheme defines such things as the location of the aiming bull, the dimensions of the targets, and the expected bullet caliber. When targets are loaded into Orion, Orion identifies the target scheme by reading the bar code in the upper left corner of the target.

Orion supports a number of different target schemes. When creating a match in Orion the designated rule book is implicitly telling Orion which type of targets will be used in

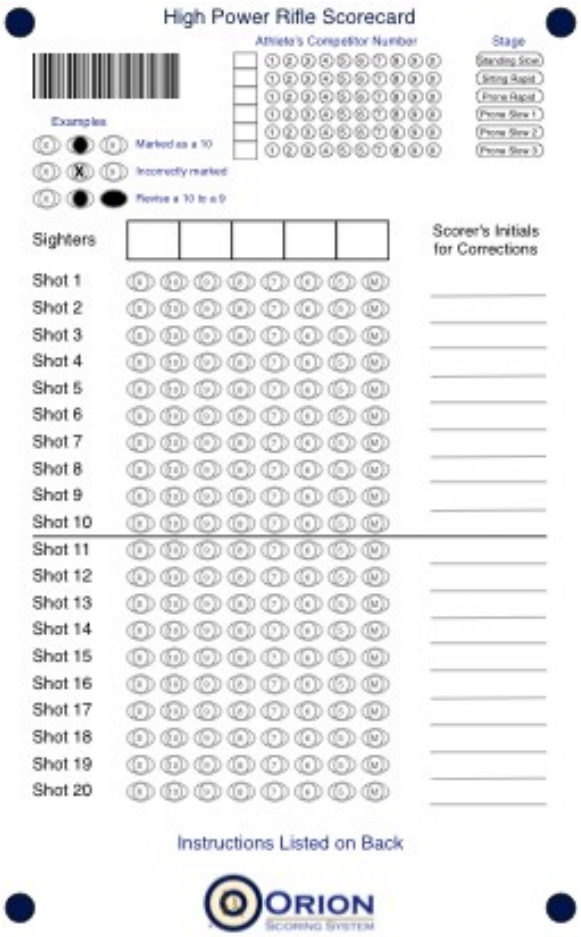


Figure 3.6: An approved High Power Rifle Scorecard for Orion

the match. Table 3.2 provides more information on the target schemes supported for each rule book.

In all cases the scoring rings printed on the target are for the shooter's reference only. While the scoring rings are printed according to tolerances set by the ISSF, Orion does not use them in the scoring process. They are there to allow the athlete to estimate his or her score and to make necessary sight adjustments.

In some instances the scoring rings are printed as a dash line. This is because the printed scoring rings are "noise" to Orion. Orion could score better if the rings were not printed at all. However, doing so would make it nearly impossible for the athlete to estimate his or her score or make sight adjustments. The dash lines are a compromise. Removing as much of the scoring ring as possible while still providing the athlete a means to estimate their performance.

3.6 Ammunition

Orion can only score targets accurately when fired with proper ammunition and well maintained rifles. Ammunition requirements are dependent on the scoring technology and are as follows.

Orion can score targets fired with guns and ammunition outside these requirements, however the accuracy standards are not supported. This includes "green" or tin pellets. In addition, due to the relative low velocity of BB Guns, some shots may not score automatically in Orion.

3.7 Scanner

A separate scanner hardware unit is required to digitize paper target images. Orion's Auto-Score technology communicates with the scanner through its TWAIN drivers. TWAIN is an industrial standard interface for scanners. The scanner's TWAIN drivers must be installed on the computer. The minimum requirements for a scanner are listed in Table 3.4. Even if a scanner meets these requirements it may still not work with Orion.

Most flat-bed scanners will meet these requirements. The reference color is the color of the bullet hole when scanned. It must either be black or white. A shade of gray or another color will not work. A4 paper size is part of the International Standard (ISO) 216 specification and is approximately 8.3 x 11.7 inches. Letter size paper is 8.5 x 11 inches. Paper thickness, sometimes referred to as media type, is a measurement as to how thick the paper can be while scanned.

When using a scanner with an automatic document feeder (ADF) it is important to verify the ADF meets or exceeds the paper thickness requirements. Most ADFs are only designed to handle traditional "copier" style paper. Target paper is much heavier weighing 200gsm (grams per square meter). Using an ADF that does not support at least 200gsm paper weight may cause undesired operation and void warranty service. The Canon P-208, DR-C225, DR-C240, DR-M160ii, and DR-6010C meet this requirement. Shooter's Technology cannot accept responsibility for damage to scanners or voided warranties resulting from use of improper ADF units.

Most scanning software by default will try to compress scanned images when saved to disk. While compressed images take up less space, they will not provide sufficient detail to score accurately. Be sure to set a scanner to be used with Orion to save the target image file to the highest available quality.

Some scanning software will try to perform image enhancement on the scanned in image prior to saving it as a file (for example edge enhancements). In almost all cases image enhancements should be disabled when scanning for Orion.

Different models of scanner function differently. Consult the individual scanner's documentation to learn how to scan and create images at the listed specifications. It is the user's responsibility to own, correctly understand and operate the scanner and scanner software. Shooter's Technology can not provide technical assistance for any scanner other than those listed as a supported scanner.

3.7.1 Supported Scanners

Orion has been tested with and currently supports the following scanners, the Canon LiDE 700F, P-208, DR-C125, DR-C225, DR-3010C, DR-M160II, DR-4010C, and DR-6010C. The LiDE 700F is a flat bed scanner, the others are all automatic document feeder scanners that allows multiple targets to be scanned in one pass. Table 3.5 compares the currently available scanners and their recommended usage [2].

The term "Supported Scanner" means Shooter's Technology will provide technical assistance to use with Orion and will achieve the typical scoring accuracy listed in Table 6.1. Unsupported scanners are likely to work with Orion but not guaranteed.

Users should not exceed the recommended number of firing points for their respective disciplines.

3.7.1.1 Canon P-208

The Canon P-208 is a small desktop scanner for use with Orion. It is best suited for home users and small rifle or pistol clubs that host only local competitions infrequently.

When using the P-208 with Orion make sure the "Auto Scan" switch is set to "OFF. " The switch is located in the back of the scanner.

The P-208 does score all types of Orion Tarets. However due to its construction the P-208 is not recommended for single bull air rifle or BB gun targets.

When using the P-208 it is sometimes necessary to provide a *gentle* push on the target to start them feeding through the scanner.

For technical support on the P-208 please consult Canon.

3.7.1.2 Canon DR-C225

The Canon DR-C225 is a mid-range scanner for use with Orion. It is the upgraded version of the DR-C125. It is best suited for small clubs that hosts relatively small to mid-size matches once a month.

When using the DR-C225 with Orion make sure the "eject selection lever" is set to the straight path position.

Due to its construction the DR-C225 does not scan single bull air rifle, and is thus not supported for these target types.

For technical support on the DR-C225 please consult Canon.

3.7.1.3 Canon DR-C240

The Canon DR-C240 is a mid-range scanner for use with Orion. It is best suited for small to medium size clubs that regularly hosts small to mid-size matches.

When using the DR-C240 with Orion make sure the "eject selection lever" is set to the straight path position.

For technical support on the DR-C240 please consult Canon.

[2]The Canon LiDE 700F, DR-C125, DR-3010C, and DR-4010C are no longer available for sale.

3.7.1.4 Canon DR-M160II

The Canon DR-M160II is a mid-range scanner for use with Orion. It is best suited for medium to large clubs that regularly hosts matches.

When scanning with the DR-M160II the paper tray should be monitored, as it can back up and jam with large paper loads.

For technical support on the DR-M160II please consult Canon. Please note that the DR-M160 is a different model scanner than the DR-M160II. Only the DR-M160II is supported by Orion.

3.7.1.5 Canon DR-6010C

The Canon DR-6010C is the highest grade scanner for use with Orion. It is best suited for a mid-size to large clubs that regularly hosts matches.

The Canon DR-6010C is specifically designed to handle heavy stock paper, such as paper targets. However, it is only designed to do so if the "Straight Path feature" is used. The straight path is when the output tray, on the back side of the scanner is open. Please see the Canon documentation for additional information on using this feature.

For technical support on the DR-6010C please consult Canon.

3.7.1.6 Canon LiDE 700F

The Canon LiDE 700F is the most economical scanner for use with Orion. It is best suited for home use or a small rifle club that hosts small, infrequent matches. The LiDE 700F is not recommended for Air Pistol scoring.

When using the Canon LiDE 700F be sure to consult the "Canon LiDE 700F Supplemental Documentation for use with the Orion Scoring System" document. This may be opened from within Orion by clicking on `Help` and `LiDE 700F Documentation`.

For technical support on the LiDE 700F please consult Canon.

This scanner is no longer available for retail purchase. Future iterations of Orion may be forced to phase out support for the LiDE 700F in order to provide upgrade services.

3.7.1.7 Canon DR-C125

The Canon DR-C125 is a mid-range scanner for use with Orion. It is best suited for small rifle clubs that hosts relatively small to mid-size matches once a month.

When using the DR-C125 with Orion make sure the "eject selection lever" is set to the straight path position.

Due to its construction the DR-C125 does not scan single bull air rifle or BB gun targets, and is thus not supported for these target types.

This scanner is no longer available for retail purchase.

For technical support on the DR-C125 please consult Canon.

3.7.1.8 Canon DR-3010C

The Canon DR-3010C is a mid-range scanner for use with Orion. It is best suited for a small club that hosts relatively small to mid-size matches once a month.

When scanning with the DR-3010C the paper tray should be monitored, as it can back up and jam with large paper loads.

For technical support on the DR-3010C please consult Canon.

This scanner is no longer available for retail purchase.

3.7.1.9 Canon DR-4010C

The Canon DR-4010C is the predecessor to the DR-6010C and is no longer available for purchase. It is best suited for a mid-size to large clubs that regularly hosts matches.

The Canon DR-4010C is specifically designed to handle heavy stock paper, such as paper targets. However, it is only designed to do so if the "Straight Path feature" is used. The straight path is when the output tray, on the back side of the scanner is open. Please see the Canon documentation for additional information on using this feature.

For technical support on the DR-4010C please consult Canon.

This scanner is no longer available for retail purchase.

3.7.2 Unsupported Scanners

Orion only supports the Canon LiDE 700F, DR-C125, DR-C225, DR-C240, DR-3010C, DR-M160II, DR-4010C, and DR-6010C. Other scanners may work as well. The minimum requirements for a scanner are listed in Table 3.4. Since every scanner functions slightly differently, even if a scanner meets these requirements it may not work with Orion.

With non-supported scanners it is necessary to tell Orion the direction of the shadow around the bullet hole. Visit Scanner Shadows Section 6.2.7 for more information.

Shooter's Technology LLC can not provide support for any scanner other than the Canon LiDE 700F, DR-C125, DR-C225, DR-3010C, DRC240, DR-M160II, DR-4010C, and DR-6010C. Although Shooter's Technology LLC will do its best to ensure Orion works with all scanners, inevitably some scanners will simply not work. It is the responsibility of the user to use a scanner compliant with Orion and assume responsibility if it does not work.

3.8 Printer

A printer is not required to use Orion to manage matches or score targets but strongly recommended. A printer is required to print barcode labels and results. Printing individual score sheets for each shooter at the conclusion of the competition is a recommended practice.

When printing barcode lables (section 5.8.2), be sure to specify within your printer drivers the media type as "Labels."

3.9 Labels

Orion uses 8.5 by 11in sheets of 1.75 by $2/3^{rds}in$ labels for printing target identifier barcodes. There are 60 labels per sheet, 4 columns of 15 rows of labels. Use Avery 8195, 5195, or equivalent label sheets. See section 5.8.2 for more information on printing target identifier barcodes.

3.10 Additional Software

Orion requires the following software to also be properly installed on the workstation it will be used on. Most new workstations come with these already installed. If the specified program is not already installed Orion may try to install it during the software installation The user may elect to install this software separately, as well.

- Adobe Acrobat Reader or any program capable of opening PDFs. Adobe Acrobat Reader is available free of charge at www.adobe.com.

Target Scheme	Common Name	Rule books
0003	10m Rifle Target	National Standard Three-Position Air Rifle
0002		
		NRA International Rifle: Air Rifle
		USA Shooting: Air Rifle
000C	10m Rifle Target (1 Bull)	National Standard Three-Position Air Rifle Rules
		NRA International Rifle: Air Rifle
		USA Shooting: Air Rifle
0023	10m BMC Rifle	National Standard Three-Position Air Rifle Rules
0007	10m Pistol Target	USA Shooting: Air Pistol
		USA Shooting: Progress-Position Air Pistol
0006	50m Rifle Reduced for 50ft	USA Shooting Rifle: Smallbore Rifle
0011		
		NRA International Rifle: Smallbore Rifle
000A	50m Rifle	USA Shooting Rifle: Smallbore Rifle
		NRA International Rifle: Smallbore Rifle
000B	50m Rifle Reduced for 50yd.	USA Shooting Rifle: Smallbore Rifle
		NRA International Rifle: Smallbore Rifle
0008	Gallery 50ft Rifle	NRA Conventional Rifle: Smallbore Rifle
001A		
0021		
000D	BB Gun	NRA BB Gun
0017		
0018		
0019		
001D	High Power Rifle Scorecard	NRA High Power Rifle
		CMP Service Rifle
001E	Rimfire Sporter Scorecard	CMP Rimfire Sporter
001F	BB Gun Test Answer Sheet	NRA BB Gun
002D		
0020	Silhouette Scorecard	NRA Silhouette
0022	Shotgun Scorecard	USA Shooting Shotgun
002A		
0012	50m Benchrest	Air Rifle Benchrest
0015		
0024		
0025		
		Smallbore Benchrest
0013	25m Benchrest	Air Rifle Benchrest
0014		
0026		
0027		
		Smallbore Benchrest

Table 3.2: Target Schemes

Scoring Technology	Air Rifle and Pistol	Smallbore Rifle	BB Gun
Bullet Diameter	4.5mm	5.6mm / .22in	4.5mm
Velocity Minimum	450fps		250fps
Type	Flathead	.22 Long Rifle	BB
Composition	Lead	Lead	Steel

Table 3.3: Ammunition Requirements

Specification	Requirement
Resolution	300 dots per inch
Color	24 bit color
Paper Size	A4 and Letter
Image Format	Lossless JPEG
Reference Color	Black or White
Paper Thickness	200gsm
Drivers	TWAIN compliant

Table 3.4: Scanner Requirements

	P-208	DR-C225	DR-C240	DR-M160	DR-6010C
Approximate Price	$200	$440	$760	$860	$2460
Supported Paper Weight (gsm)	209	205	209	255	250
Scanning Speed (targets per minute)	About 6	About 20	About 25	About 55	About 55
Targets per scanning pass	About 4	About 10	About 20	About 20	About 40
Recommended Number of Firing Points - Rifle	1 to 4	1 to 12	1 to 30	8 to 40	8 to 40
Recommended Number of Firing Points - Pistol	1 to 4	1 to 8	1 to 24	6 to 30	6 to 30
Recommended Number of Firing Points - BB Gun	1 to 4	1 to 8	1 to 24	6 to 30	6 to 30
Recommended Number of Firing Points - Benchrest	1 to 4	1 to 8	1 to 24	6 to 30	6 to 30
Recommended Weekly Practice Sessions	1 to 5	1 to 5	1 to 7	2 to 7	2 to 7

Table 3.5: Supported Scanner Comparison

Chapter 4

Shooter Database

The Orion "shooter database" has two functions. First, to allow the user to keep a list of shooters who frequently shoot at at an Orion range. Second, to track and analyze shooter performance over time. This chapter describes how to setup and manage shooters within the shooter database.

The Orion database maintains a list of shooters and tracks these shooter's performance over time. Who is added to the database is a matter of choice. While many users will only add team members, common visiting teams or other shooters may be added to this database for similar purposes.

There is only *one* database file for each licensed copy of Orion. The database will aggregate scores from *many* Orion match files. The competitors in a match may or may not be the same as the shooters in the database. When a shooter is added to a match from the shooter database Orion uses the information in the database as default values for the match competitor. Once a competitor is added to a match there is only a loose connection between the shooter in the Shooter Database and the shooter in the match.

4.1 Configuring the Shooter Database

Setting up the Orion database is a matter of deciding what shooter information to track. The user may track scores from different shooting styles, membership numbers, and optional fields.

The Shooter Database is configured in the `Shooter Properties` form. To open click on, from Orion's menu bar, `Database` and then `Database Properties`.

4.1.1 Shooting Styles

In Orion, a "Shooting Style" is high level description of the type of shooting a team or club may be involved in. A team's shooting style then drives the type of information Orion displays about each shooter. For example, if a team competes in three-position air rifle competitions, Orion will display score averages for prone, standing, and kneeling shot with an air rifle, but won't display scores fired for National Match Air Rifle.

Selecting the shooting style does not inhibit the types of matches that can be run with Orion, it simply selects the analytical score information Orion displays for favorite shooters.

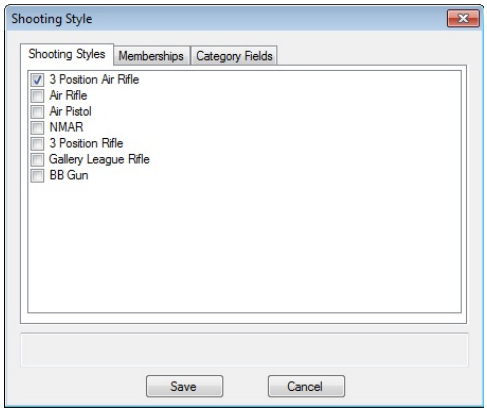


Figure 4.1: Example Database Properties for a club that participates in Three-Position Air Rifle.

4.1.2 Membership Fields

A "Membership Field" allows the user to track membership or membership numbers. Membership Field values are often used as competitor numbers in a match. There are many types of membership values available to track or you can add your own. For example:

- Civilian Marksmanship Program competitor ID.
- USA Shooting membership number.
- School ID.

When used in conjuction with competitor numbers within the Assign To process, membership field values should either be all numeric (6 digits or less) or all alphabetical (6 characters or less recommended) (See section 5.8).

When shooters are added to a match, it is possible to configure Orion to use a particular Membership Field as the default competitor number (see section 5.2.4).

4.1.3 Category Fields

"Category Fields" are optional field values. If selected these field values will automatically be imported when a shooter is added to the match from the Shooter Database.

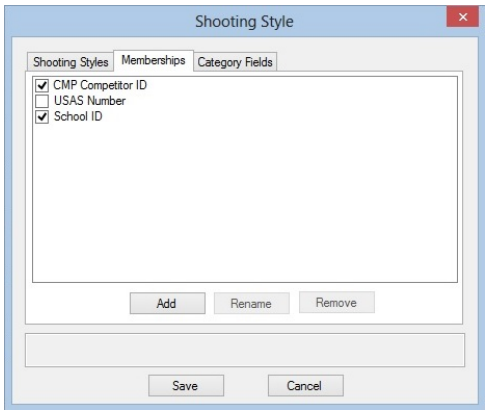


Figure 4.2: Example Membership values for a club.

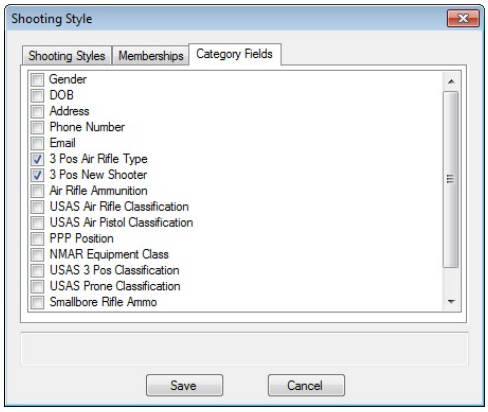


Figure 4.3: Example Category Fields for a club that participates in Three-Position Air Rifle.

4.2 Managing Shooters in the Shooter Database

The Shooter Database is visible on the `Shooter Database` tab. Managing shooters in the shooter database is similar to working with a spreadsheet.

- Add a new shooter by typing in the shooter's name in the last row.
- Edit a shooter by modifying any of the column values.
- Remove a shooter by selecting the row, right clicking, and selecting `Remove Shooter`.

4.2.1 Favorite Shooters

"Favorite" shooters are the shooters the user is most interested in tracking. Usually they will be the current members of the user's team or club.

Favorite shooters are automatically added to each new match. Favorite shooters are also listed in the `Dashboard` and `Analysis` tools.

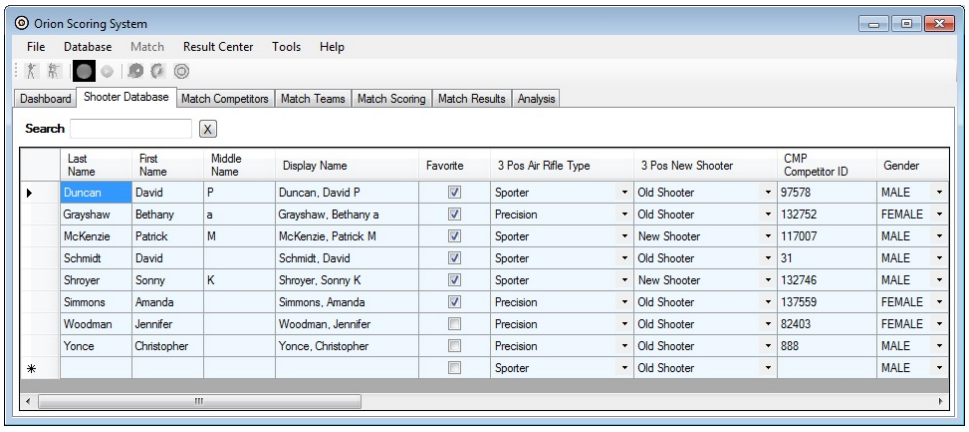


Figure 4.4: Example Shooter Database for a small team.

Orion at Home users should list themselves as a Favorite.

4.3 Dashboard

The Orion Dashboard is a quick-look analysis tool for coaches. It is meant to give coaches a snap-shot as to how team members are performing.

The Orion dashboard is visible when Orion opens, and is on the `Dashboard` tab. Orion only displays information for Favorite shooters (see section 4.2.1).

- Each shooter listed on the dashboard is a `Favorite`.
- The `Event Styles` are derived from the type of shooting selected in the Shooter Database (see section 4.1).
- The presented data is calculated by scores fired in the past 60 days.
- `Number of Shots` is the count of shots fired in that position.
- `Average Score` is the shooter's statistical average for that position.
- `Score Trend` is the number of points a shooter is improving (or digressing if the trend is negative) on a points per month basis.
- `Average Group Size` is the shooter's statistical average group size for that position. This is measured in mm^2.
- `Group Trend` is the improvement or digression in group size. Small groups are better ergo if a shooter is improving his or her group trend will be negative. This is measured in mm^2 per month.

Metric	Meaning
Score	The 10 shot average score the shooter shot.
Number of Shots	The total number of shots fired by the shooter.
Group Size	Measured in mm^2, is the area where statistically 90% of the shooter's shots were located.
Group Center	Measured in mm, is the distance from the center of the aiming bull to the geometric center of the shooter's shots.
Group Roundness	Is the relative measure as to how round the shooter's group was. Roundness of 1.0 is perfectly round.
Group Major Axis	Measured in mm, is the longest distance within the shooter's statistical 90% group area.
Group Minor Axis	Measured in mm, is the shortest distance within the shooter's statistical 90% group area.
Relative Velocity	Meaningful only for air rifle and air pistol, this is a relative measurement of the velocity of shots fired by the shooter.

Table 4.1: Description of the available scoring metrics within Orion

4.4 Shooter Analysis

The Orion Analysis tool lets a user graphically see the trends of shooters in the database over time. This is available in the `Analysis` tab.

Any designated Favorite shooter may be selected (see section 4.2.1) as well as from performance in designated Shooting Styles (see section 4.1.1). Only one metric as a time may be selected. Table 4.1 describes the available metrics and their meaning.

Chapter 5

Match Management

While there is only one Orion database, each training session or competition is organized into an independent "match."

An Orion "match" is a collection of shooters, teams, scores, results, and various other properties describing the course of fire. In Orion, a match can describe either an actual competition or a training session. Stated another way, an Orion match is the data file used to store everything associated with scoring a course of fire.

This chapter describes creating and modifying a match, managing shooters, and managing teams.

5.1 Welcome Screen

When Orion opens up it presents the "Welcome Screen" to the user. The Welcome Screen is designed to quickly facilitate creating and opening matches, as well as providing important information about your Orion account. Most of it's functionality requires Internet access.

1. The `Create a New Match` section allows you to either create a new match based on one of your match favorites or download a Virtual Match you have been invited to join. Both types of matches are listed in the list box. To create a match, or download a Virtual Match, simply click on the name.

   When creating a match based on a match favorite, by default Orion does not list the match within the Result Center. To enable online results when you create the match, put a checkmark in the "Enable Online Results" checkbox, then click on the favorite to create.

   Immediately below the Create a New Match are two links. The `Create a Local Match` can be used to build a custom match using the Match Properties dialogue box. The `Create a Virtual Match` is used to create a Virtual Match Parent.

2. The `Open a Recent Match` list box lists the four more recent matches you had opened. Click on the name of the match to open.

ORION
SCORING SYSTEM
Welcome to the Orion Scoring System
West Potomac High School
Account Number 1234
Create a New Match
Enable Online Results
2015 Northeast Regional Virtual Match
Daily Practice
USA Shooting Men's Air Rifle
USA Shooting Women's Air Rifle
Create a Local Match
Create a Virtual Match
Open a Recent Match
Thomas Johnson Invitational
Match 27 Aug 2015
Cadet Qualifications
Match 26 Aug 2015
News and Updates
Register now for the National Air Rifle League
Introducing the all new Canon DR-C240 Bundle
An Invitation from the US Army Marksmanship Unit
Like us on Facebook!
Result Center
Recent Matches: 4
Number of Starts: 84
Number of Page Hits: 392
Your team's Home Page
License Information
Your Orion license will expire in approximately 4 months.
Software Update Avaliable
Installed Version: 2.3.21
Production Version: 2.3.22
Learn how to update your Orion Software

Figure 5.1: The Welcome Screen is designed to quickly facilitate creating and opening matches, as well as providing important information about your Orion account.

3. The `News and Updates` list box lists any recent news, including competition results, from Orion. Click on the item to bring up the relavant web page for more information.

4. The `Result Center` section lists basic web site statistics for matches you have listed on Orion's Result Center for the past 30 days. `Recent Matches` is the number of matches you have listed on the Result Center. `Number of Starts` is the aggregate number of athletes who have participated in your matches. `Number of Page Hits` is the number of times someone has viewed one of your match results online.

   Normally the `License Information` section will list how many days or months you have remaining on your Orion license. It may also notify you if your license is expired, or if you have a new license waiting to be installed.

5. The `Software Update` section will notify you if there is a new version of Orion available for installation.

5.2 Match Properties

Match Properties describes the configuration for a match. This includes such details as the course of fire, tie breaking rules, how many shots per aiming bull, competitor number assignment, and much more.

The `Match Properties` form is accessible in an open match by going to `Match` and then `Match Properties`. Figure 5.2 shows the `Match Properties` form.

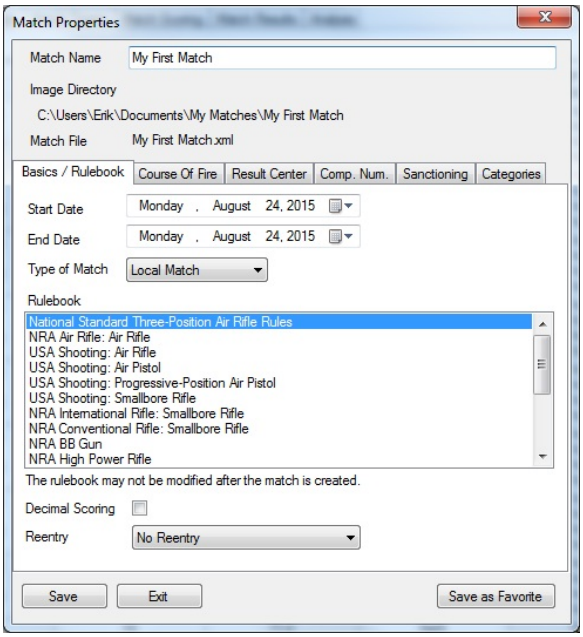


Figure 5.2: The Match Properties form is used to configure an Orion match.

After a match is created many match properties can not be modified. These include the rule book selection, course of fire, and decimal scoring. In a Virtual, Match categories also may not be modified after the match is created.

5.2.1 Basics Rulebook Tab

5.2.1.1 Start and End Dates

The `Start Date` and `End Date` are largly used for informational purposes only. The dates are printed on result printouts but otherwise do not have any effect on the conduct of the match.

The `Start Date` and `End Date` do effect how a match is listed within the Result Center (see chapter 8). On or after the `Start Date` matches are listed within `Recent Results`. On or before the `End Date` matches are listed within `Upcoming Matches`.

In a Virtual Match Parent (see section 5.3.2), the `End Date` is the last date a child match has to download and join the match. The child match has up to 3 days after the `End Date` (as set by the parent) to report scores.

5.2.1.2 Type of Match

The `Type of Match` effects how a match may be listed online, but otherwise does not have any effect on a match.

Orion Rulebook	Tie Breaking Rule Reference
National Standard Three-Position Air Rifle *	8.6.1
NRA Air Rifle: Air Rifle *	15.3
USA Shooting: Air Rifle	6.15.1
USA Shooting: Air Pistol	6.15.1
USA Shooting: PPP *	8.4
USA Shooting: Smallbore Rifle	6.15.1
NRA International Rifle: Smallbore Rifle *	15.3
NRA Conventional Rifle: Smallbore Rifle *	15.7.2 b
NRA BB Gun *	15.3
NRA High Power Rifle	15.4
CMP Service Rifle	7.1.3
CMP Rimfire Sporter	3.8.4
USA Shooting Shotgun	9.15.2
American Skeet and Trap ***	NSSA 8.d and 8.e
NRA Silhouette **	15.3.b
Smallbore Benchrest *	C.9
Air Rifle Benchrest *	C.9

Table 5.1: Tie breaking rule references.

5.2.1.3 Rulebook

An Orion rulebook contains pre-established rules on how a match will be governed. Courses of fire, tie breaking rules, and penalties are all dependent on the rulebook. Rulebooks are often derived from, and named after, an actual rule book maintained by a governing body (e.g. USA Shooting).

The rulebook selection drives the following properties inside of Orion:

- Available courses of fire.
- How certain penalties will be applied.
- Available award categories.
- How shooters and teams are ranked (e.g. tie breaking rules).

The only opportunity to select or modify the rulebook is when the match is created. The rulebook may not be updated after the match is created.

5.2.1.4 Tie Breaking Rules

Orion breaks ties according to the tie breaking rules specified in Table 5.1.

* Irregardless of rulebook when decimal scoring is used Orion breaks ties by USA Shooting rule 6.15.1. This is because only USA Shooting specifies how to break ties with decimal scoring.

** Silhouette ties for individuals are broken by highest number of hits in the Shoot Off stage. If no Shoot Off was fired, and in team events, ties are broken by the last series of Rams, then Turkeys, then Pigs, then Chickens, counting backwards.

*** With the American Skeet and Trap rulebook, if a Shoot Off score is recorded, then it is used to break the tie. If a Shoot Off is not recorded then the longest run, as defined by the NSSA rulebook 8.d is used to break the tie.

5.2.1.5 Decimal Scoring

When `Decimal Scoring` is enabled all shots are scored with tenth ring values (e.g. 10.3 or 8.9). When it is disabled, shots are scored with Integer values (e.g. 10 or 8). Courses of fire labeled with "with Final" always have the Finals scored in decimal.

The only opportunity to select or modify `Decimal Scoring` is when the match is created. `Decimal Scoring` may not be updated after the match is created.

5.2.1.6 Reentry

A "Reentry" match is a generalized term refering to competitions where athletes and teams are able to shoot the same course of fire multiple times. A match participant's results are based on the reentry configuration. While there are many variations of this theme, the most common is taking a participant's highest score. Orion plans to expand the number of reentry options in the future. Currently there are three reentry options.

- `No Reentry` is the default, with it all reentry calculations are turned off. Partcipants may only shoot the course of fire one time, and results are based on their score during that one firing.
- `Highest Score from EVENT` is when the highest aggregate score is used in the rankings. For example, if an athlete in a 3x10 shoots a 281, 275, and 283, his final score for the match would be the highest score, the 283. In a team match, the team score is based on the highest aggregate team total, from when the team collectively shoots the cousre of fire.
- `Highest Score from STAGE` is when the highest stage scores are used in the rankings. For example, in a 3x10, the athltes finals score is the aggregate of his or her best score from prone, standing, and kneeling. In a team match, the team score is based on the highest stage aggregates, from when the team collectively shoots the course of fire.

Visit Section 6.5 for more information about managing a reentry match.

5.2.2 Course of Fire Tab

The course of fire determines how many shots are fired in which positions. The available courses of fire are based on the selected rule book.

Scoring Technology	Competition	Recommended Training
Air Rifle	1	1, 2, or 5
BMC Air Rifle	1, 2 or 5	5 or 10
Air Pistol	1, 2 or 5	5 or 10
50ft Rifle	1	1 or 2
50m/yd. Rifle	1, 2 or 5	5 or 10
BB Gun	1	1
Benchrest	1	1

Table 5.2: Allowable Shots per Bull

The only opportunity to select or modify a course of fire is when the match is created. The course of fire may not be modified after the match is saved for the first time.

All matches in Orion have individual and team capabilities.

5.2.2.1 Shots per bull

The `Shots per bull` will be the number of shots Orion will try to find on each aiming bull while scoring a target. The available options are always 1, 2, 5, and 10. However, care should be taken to select a value appropriate for the level of the competition/practice, and disipline. When running a competition select only 1 shot per bull for Air Rifle, BB Gun, 50ft Rifle, or benchrest. Air Pistol and 50m/50yrd. smallbore rifle events may select up to 5 shots per bull in a competition. Shooting 5 shots on a bull in Air Rifle or 10 shots on a bull for Air Pistol is only intended to be done for less experienced shooters during training. Multi-shot scoring is not supported for BB Gun.

5.2.2.2 Team Member Configuration

The `Number of Team Member` will have slightly different effects depending if `Dynamic Team Generation` is turned on.

- If `Dynamic Team Generation` is not enabled, then the `Number of Team Members` specifies how many of the top shooters from each team will make up a team score. If for example the `Number of Team Members` is 4, Orion (in this example) would only sum the top 4 shooters to compute the team score regardless of participants in the team.
- If `Dynamic Team Generation` is enabled, then Orion will automatically create dynamic teams based on the individual team member results. For example, if a team has 12 members, and `Number of Team Members` is 4, Orion will create three teams in the results. "Team 1" will be the top four shooters on the team, "team 2" will be shooters 5-8, and "team 3" will be shooters 9-12.

`Max Number of Team Members` sets the limit to the number of team members that can be assigned to any one team. `Max Number of Team Members` must be equal to or

greater than `Number of Team Members`. By default this value is set to 100, effectively allowing any number of athletes to be assigned to any one team.

5.2.2.3 Invert Group Analysis

The `Invert Group Analysis` is used almost exclusively for BB Gun shooting. When used Orion will invert shot coordinates from a target for purposes of group analysis. It does not effect the score. It does so for all shooters in the match, this property can not be adjusted on a per shooter basis.

This functionality is deprecated and may not be avaliable in future versions.

5.2.2.4 Finals

Orion supports two types of Finals, the original 10 shot format and the new 20 shot "start from zero" format.

Course of fire that include "with Final" in the name refer to the original and older Finals format. This is when the top eight competitors, after qualification, shoot an additional 10 shots. The 10 shots in the Finals are added to the qualification to determine the winner. The Finals scores in this format are always scored with decimal precision.

The course of fire simply named "Finals" is the new 20 shot "start from zero" format. The format was introduced by the ISSF in 2012. To successfully conduct a Finals competition the stat officer and match director should perform the following.

- Be familiar with the Finals format.
- Create a new Orion match with a Finals course of fire.
- Use Decimal scoring.
- Only have 8 athletes in the match.
- Use single bull targets, shooting one shot per bull.
- Score each shot immediately after calling "stop."
- Eliminate one athlete after each series, starting with the third series.

For training purposes the above recommendations may be ignored.

5.2.2.5 Training Sessions

Under each rule book there is a `Training` course of fire. In "Training" shooters may shoot up to 6 ten shot strings in each position, except finals. This is advantageous for training sessions where different shooters will want to shoot different amounts in each position. For example one shooter may want to shoot 40 shots standing, and a second shooter may want to shoot 20 prone and 20 kneeling.

When using the Training course of fire course of fire barcode labels are not supported, instead use generic bar code labels (see section 5.8.2.1).

5.2.3 Result Center Tab

Result Center is the online component for Orion. With it a user may seamlessly post match results on the Internet.

To enable posting a match's results online check the `List and Report Scores Online` checkbox. Un-checking the option will remove the match from the Result Center.

For local matches, the remaining contact information fields are optional, any information entered in the Results Center tab will be available online. For Virtual Matches `City` and `State` are required.

See Chapter 8 for more information on the Result Center.

5.2.3.1 Tournaments

A "Tournament" is an online grouping of matches. The `Tournaments` selection box will list those tournaments you have permission to join or have already joined.

See Section 8.3 for more information on Tournaments.

5.2.4 Competitor Number Tab

The `Comp. Num.` (Competitor Number) tab allows the user to configure how Orion will initially assign competitor numbers. There are four options.

- Do not automatically assign a competitor number.
- Use the value of a Membership Field from the shooter database. This option is only valid for shooters added from the shooter database.
- Assign sequential competitor numbers.
- Use text based name abbreviations.

With `text based name abbreviation` Orion will assign an alphabetical value only competitor number based on the shooter's name. The name abbreviation is typically a variation of the athlete's first name, last name, or initials. These are intended to be used with text based fill-in-the-bubble competitor numbers on all new and redesigned Orion targets.

Optionally, `Use sequential competitor numbers as secondary source` or `Use text based name abbreviation as secondary source` when a shooter does not have a membership field value. To track membership numbers from other organizations use `Separately, track Membership Field`. This is for information purposes only and does not effect competitor numbers or assigning targets to shooters.

These settings may be changed after a match is created. However, the modified setting will only effect new shooters added to the match; shooters already in the match will not have their competitor number modified. Visit section 4.1.2 for more information on Membership Fields.

5.2.5 Sanctioning Tab

If the match the user creates is sanctioned by the Civilian Marksmanship Program (CMP) Orion provides an automated method for reporting the scores to the CMP. In order to activate this feature the CMP match ID and authentication code must be entered in the `Sanctioning` tab. This information should have been provided when the CMP sanctions the match. If this information has not been provided contact the CMP.

Visit Section 7.6 for more information on submitting scores to the CMP.

5.2.6 Categories Tab

In the `Categories` tab Orion provides functionality to create custom result list categories based on the selected rule book. This information may be updated after the match is created.

5.2.6.1 Categories found in most or all Rule books

- Regions will group shooters together by the state, or in some instances, the country of residence. To use Regions shooters and teams must have either the two letter state code included, or the 3 letter country code. For example "VA" or "GA" for the state codes, or "SUI" or "MEX" for the country codes. Orion will only recognize a limited number of countries.
- The Age Category allows the user to subdivide individuals and teams based on the rule book's age groups. An individual or team is binned into one of the age groups based on the year he or she was born and the year of the match.
- Gender refers to male or female shooters. For a team to be categorized as either male or female, all members of the team must be of the same gender.

5.2.6.2 National 3-Position Air Rifle Council Categories

- The Equipment Class refers to either precision rifle or sporter rifles. If the match only has one equipment class it is recommended to deselect this options.
- The New Shooter category creates a special result list for "new" and "old" shooters. The definition for new shooters is made by the match director. Generally this term will refer to a shooter who only started in the sport less than a year ago.
- The Organization category allows the user to subdivide individuals and teams based on the type of club or organization they represent. Up to six different organization classes may be created. Orion pre-populates these fields with the most common values. To change the values simple type over the names. A field may be left blank. The Organization category is not available in a Virtual Match.
- The Skill level category allows the user to subdivide individuals and teams based on their skill level. Although similar to the New Shooter category this allows the match

director to create result lists for up to six different skill levels.The Skill level category is not available in a Virtual Match.

5.2.6.3 USA Shooting rule books Categories

- Classification refers to USA Shooting's skill level classification.
- Eligibility refers to USA Shooter's eligibility rule.
- Collegiate refers to whether a shooter is enrolled in college or university.
- Adaptive Classification allows the match director to subdivide individuals and teams based on their skill level. Although similar to the Classification category this allows the match director to create result lists for up to six different skill levels of his or her choosing. The Adaptive Classification category is not available in a Virtual Match.

5.2.6.4 Position Progressive Pistol rule books Categories

- PPP Position refers to three positions recognized by the NRA and USAS PPP rule book. These are `Basic Supported`, `Standing Supported`, `Sub-Junior International`, and `International`.
- Adaptive Classification allows the match director to subdivide individuals and teams based on skill level. Although similar to the Classification category this allows the match director to create result lists for up to six different skill levels of his or her choosing. The Adaptive Classification category is not available in a Virtual Match.

5.2.6.5 National Match Air Rifle Categories

- Equipment class refers to either Match rifles, Sporter rifles, or AR-Type rifles..

5.2.6.6 NRA Categories

- Classification refers to the NRA's skill level classification for that specified event. Orion does not calculate team classification. The statistical officer must do so and select the appropriate classification for the team.
- The User Specified category allows the user to subdivide individuals and teams based on selected values. The user may specify the names of individual categories in the fields below.

5.2.7 Match Favorites

A "Match Favorite" is a set of saved match properties that you can use, at a later time, to quickly create similiar matches.

To save the properties of a match as a Match Favorite click the `Save as Favorite` button from within the `Match Properties` window. Note that a Match Favorite must be saved in the "FAVORITES" folder under My Matches (this is the default save location).

Use a meaningful name when saving Match Favorites. This name will appear in the Welcome Screen as an option when you start Orion.

5.3 Virtual Matches

Orion natively supports "Virtual Matches." A Virtual Match is when two or more clubs or individuals compete against each other at geographically different locations. While the competition at each location is run independently, the scores are seamlessly merged together online. Anyone watching the scores online will see no difference between a Virtual Match and a traditional match.

The traditional type of match is called a "Local Match." A Local Match has only a single location. The entirety of the match management and scoring is done locally.

Running a Virtual or a Local Match is almost identical with Orion. All aspects of match management and scoring have the same process for Virtual and Local Matches. The only difference is in creating the match. Because the administration of a Virtual Match is distributed it is important for all locations to use equivalent match properties. To achieve this a "parent" match is created first. This sets the properties for the match. Then "child" matches are created from the parent inheriting the same properties as the parent. Hosts who participate in a Virtual Match download the child match instead of creating it.

Internet access and a Result Center account is required to participate in a Virtual Match. See Chapter 8 for more information about the Result Center.

Only Orion for Club and Orion Cite License users may create a Virtual Match. They may also participate in Virtual Matches. Orion at Home users may participate in a Virtual Match as a child but can not create them.

5.3.1 Understanding Virtual Match's Parent Child Relationship

Virtual matches work on a "parent - child" relationship. There is one parent match and many possible child matches. The parent creates the virtual match and its properties. Children matches inherit the match properties.

The parent match has the bulk of the control of the match. The parent creates the match, sets the rule book, course of fire, categories and other match properties. When a parent match is created the match properties are uploaded to the Result Center. The parent also gives permission to other Orion users to participate in the match, these are known as the child matches.

A child match must have exactly the same properties as the parent match. As a result when a child match is created, it is created based on the properties stored in the Result Center. This is known either as downloading the child match, or joining the Virtual Match. Child matches has no control over the rule book, course of fire, or categories.

Competitor management and scoring is identical for both parent and child matches.

5.3.2 Creating Virtual Matches

Creating a Virtual Match has a number of steps. These are as follows:

1. Create the parent match. Performed by the primary match sponsor.
2. Create the child matches. Performed by the primary match sponsor.
3. Download the child matches. Performed by each of the secondary match sponsors.

5.3.2.1 Creating the Parent Match

Creating the parent match is performed only by the primary match sponsors. Creating the parent match subsequently creates the Virtual Match. Virtual Matches may only be created by Orion for Club and Orion Site License users. To create the parent match:

1. There are two ways to create a parent match:
   (a) If the Welcome Screen is open, click the `Create a Virtual Match` link. The `Match Properties` window will appear.
   (b) If the Welcome Screen is closed, click on `File` then `New Match` and then `Create a New Virtual Match Parent`. The `Match Properties` window will appear.
2. Set the Match Properties specific to the match (see Section 5.2).
3. Click the "Save" button.

Because the properties of a Virtual Match are distributed to its children Orion must restrict updating a number of match properties. The rule book, Course of Fire, and Categories can only be set when the Virtual Match is created. It is important to double check these properties before creating the match.

5.3.2.2 Creating the Child Matches

Creating child matches is performed only by the primary match sponsor. Creating a child match is equivalent to allowing another Orion user permission to participate in the Virtual Match. Other Orion users may not participate until the primary match sponsor creates the child match for them. All Orion users, including Orion at Home users, may participate in a Virtual Match as a child. To create a child match:

1. Open the applicable parent Virtual Match.
2. Click on `Match` and then `Virtual Match Children'` The `Virtual Match Children` window will appear.
3. For each Virtual Match host:

(a) Search for the Orion club or team to add under the `Add a Child Virtual Match` tab.

When searching for another Orion club or team the user may search for the team name or Orion account number. If the team cannot be found it likely means this club or team either does not have Orion or has not enabled Result Center.

(b) Select the team or club, then click on `Add`.

(c) Confirm the addition of the specified team.

Once a child Virtual Match is created, it is not possible to later remove this child from the match. While not necessary it is possible for the primary match sponsor to create a child match for his or her own Orion account. It is also possible to create multiple child matches for a single Orion Account.

Orion stores the match properties for the child match in the Result Center. The next step is for the secondary match sponsors to download the match properties to their copy of Orion.

5.3.2.3 Downloading a Child Match

Downloading the child match is performed only by the secondary match sponsors. It can only be done after the primary match sponsor creates the child match and the match properties are stored in Result Center. the secondary match sponsors may only then download the match properties to their version of Orion.

- If the Welcome Screen is open, under `Create a New Match` click on the name of the child match to download and join it.
- If the Welcome Screen is closed, click on `File` then `New Match` and then `Download a Virtual Match Child`. Select the match to download, click on `Download`. The match will be downloaded and saved to the local machine running Orion.

A child match may only be downloaded once. Child matches can upload scores to the Virtual Match up to one week after the match's end date specified by the parent.

5.4 Working with the Match File

5.4.1 Creating a Local Match

A Local Match is one where the entirety of the match administration is done locally. See Section 5.3.2 for more information on creating a Virtual Match instead.

To create a new Local Match select `File` then `New Match` from the menu bar.

It is important to select the correct rule book and course of fire when creating a match. This is the only opportunity to set these fields. Orion will verify the rule book and course of fire before creating the match.

5.4.2 Opening an Existing Match

There are two ways to open an existing match.

The first is to select `File` and `Open Match`. The standard Windows open file dialogue will appear within the `My Matches` directory. Double click the image directory folder corresponding to the match to be opened, then double click the `xml` file within this directly.

If the match to be opened is one that has been worked on recently it may automatically appear in the `Recent Matches` list. Simply click `File`, then `Recent Matches`, and then the name of the match to open.

Once a match is open, the name of the match will appear in the Title Bar.

5.4.3 Copying an Existing Match

Copying a match is useful for either making a backup copy of the existing match, or creating a new match with the same shooters, teams, and course of fire of an existing match but without the scores.

5.4.3.1 Creating a Backup Copy of an Existing Match

Orion automatically makes a backup copy of a match. The purpose of these backups is to restore Orion to a known good state after a program crash, loss of power to the Orion workstation, or similar event. For more security it may be desirable to make a manual backup copies. For example, creating a backup copy after the scoring for each relay is complete.

To copy a match for the purpose of making a backup copy:

1. From the menu select `File` and then `Save a Copy`.
2. Orion will ask if scores from the existing match are to be included in the backup copy. Since this is a backup copy select `Yes`.
3. In the `Save As` file dialogue box change the name of the back up file if desired.
4. Click `Save`.

5.4.3.2 Creating a New Match Based on an Existing Match

It is often desirable to copy the shooters and teams from an existing match as a starting point for a new match. A number of clubs host numerous matches with almost the same competitors shooting each time.

To copy a match, for the purpose of creating a new match with the same shooters, teams, and course of fire:

1. Open the match that will be copied (see section 5.4.2).
2. From the menu select `File` and then `Save a Copy`.

3. Orion will ask if scores from the existing match are to be included in this copy. Since this copy is being created for the purpose of starting a new match select `No`.
4. As this match is being created for the purpose of starting a new match a new Match Image Directory will need to be made to store the file in (see section 5.5.2).
   (a) In the `Save As` file dialogue box that appears change directories to the My Matches folder.
   (b) Click the `New Folder` button.
   (c) Change the name of the new folder to the name of the match that is being created.
   (d) Double click the new folder to open it.
5. Change the name of the file to the name of the new match (this will be the new match.xml file). The file name needs to have an `.xml` extension.
6. Click `Save`.

After Orion creates a copy it will leave the file that has been copied open. Before loading targets and scoring open the newly created match.

5.4.4 Closing a Match

The currently open match may be closed by selecting `File` and `Close Match`. All information will be saved when a match is closed.

Be sure all scoring operations are finished prior to closing a match. Closing a match while Orion is scoring may lead to undesired operations.

5.4.5 Saving a Match

Orion automatically saves updates to the match file. There is no need to save the match file other than for manual backups (see section 5.4.3.1).

5.5 The Match File and Directory Structure

Orion automatically manages a series of directories on the local machine for the purpose of storing match data files and target images. The top of this directory structure is generically known as the "My Matches" directory. Underneath My Matches is a series of directories corresponding to each match that the user creates. An additional directory "DATABASE" stores the Shooter Database.

5.5.1 My Matches Directory

The "My Matches" directory is the top of the directory structure that Orion manages. Underneath My Matches is a series of directories corresponding to each match that the user creates. These directories are called "Match Image Directories." There is an additional directory under My Matches, "DATABASE," that stores the Shooter Database, and "FAVORITES" that stores match favorite settings.

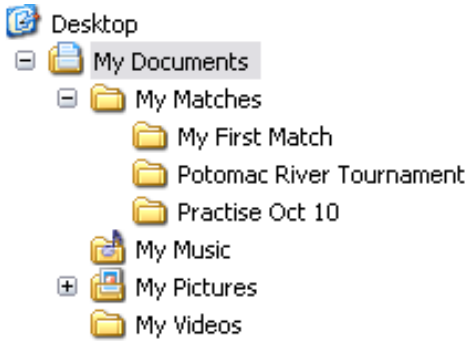


Figure 5.3: An example My Matches directory structure.

5.5.1.1 Changing the Location of My Matches

On occasion it may be necessary to change the location of the My Matches directory. The most common reason is if the target image files (which take up a lot of room) are to be stored on a different or external hard drive. In general though, it is best to keep the default location for My Matches.

To change the location click on `Tools` and then `My Matches Directory`.

Changing the My Matches directory to reside on a thumb drive is strongly discouraged. Thumb drives are not intended to be used consistently over long periods in the same manner as a hard drive, and Orion requires this functionality.

5.5.2 Match Image Directory

There is one "Match Image Directory" for each match created with Orion. Orion automatically creates the directory, along with the Match XML File, when the match is created. It is created under the My Matches directory.

If the Match XML File is moved to a different directory, that directory becomes the Match Image Directory for the match.

With Auto-Score Orion will automatically store all digitized target images in the Match Image Directory for the specified match. If Auto-Score is not used it is important to save the scanned target images in this directory.

To learn the complete path of the Match Image Directory open Match Properties by going to `Match` and then `Match Properties`. The Match Image Directory is listed near the top of the form.

5.5.3 Match XML File

Orion creates a single file, called the "Match XML File," that contains all data and scores from a match. The match xml file is saved within the Match Image Directory. The name of the file will be the name of the match with a `.xml` extension. Users should not edit the match xml file [1].

Orion automatically creates two backup files. These files have the same name as the match xml files, but with a `.bu1` and `.bu5` extension. The extensions stand for "backup 1 minute" and "backup 5 minutes" respectively.

5.6 Competitor Management

Competitor management is the process of tracking shooters, coaches, and other participants within a match.

Competitor management is done on the `Match Competitors` tab, and when a match is opened.

5.6.1 Adding a Competitor

There are multiple ways of adding a competitor to a match.

- Select `Match` and `New Shooter` from the menu bar.
- Press the `ctrl` (Control) and `n` simultaneously.
- Hit the `New Shooter` button .
- Scroll to the bottom of the competitor table and enter new shooter information in the last row.
- In the last row, select the database shooter's name from the `Database Shooter Link` list.
- From the `Database Shooter` tab, select the shooter you wish to add, right click, and click on `Add Shooter to Match`.

Orion at Home users are limited to four competitors in a match. While Orion for Club and Orion Cite License users may add as many competitors to a match as they desire. For practical purposes 200 is the recommended maximum.

Orion requires `Last Name` and `First Name` fields values.

If the user is conducting a match sanctioned by the Civilian Marksmanship Program and wishes to report scores electronically (see section 7.6) all competitors must have a CMP competitor number and this number must be used as the Orion competitor number. This is only the case for CMP sanctioned matches

[1] We're not kidding, don't edit the match xml file. Even if you think you know what you are doing, don't edit the match file. Heck, even if you do know what you are doing, don't edit the match file

The `Display Name` is automatically derived from the competitor's name and ID fields. It may be overridden if desirable.

The `Relay` field allows competitors to be grouped into their respective firing relays. Each shooter can be assigned to a relay 1 through 24. By default a shooter is assigned to relay 1. Within Orion using relays is most helpful during the scoring process. In the scoring tab competitors are grouped by their relay making it easier to find and work on a smaller set of competitors during a match.

5.6.2 Linking Match Competitors and Database Shooters

In order for the Orion database to receive scores from a match, the competitors in the match must be linked to shooters in the database. This is done by selecting the database shooter from the drop down list in the `Shooter Database Link` column.

If a shooter is a favorite or was added from the shooter database the link between the competitor and the database shooter already exists.

While this operation will link the scores, all other information between the match competitor and the database shooter are not linked. For example, if a competitor's `Email Address` is updated in the match Orion will not update the `Email Address` for the corresponding database shooter.

5.6.3 Coaches

In some competitions it is desirable to list a team's coach or an individual shooter's coach in the result bulletin. To accomplish this in Orion add each Coach as a participant in the match. Then for the individual shooter or for the team select the coach from the provided drop down list.

When results are ready to be printed, be sure to check the "Include Coach and Hometown on Printout" on the Results tab to list the coach next to the shooter.

5.6.4 Removing a Competitor

A competitor may be removed by selecting the row listing the competitor, right clicking the row, then clicking `Remove Competitor`. This will remove the competitor and disassociate any scores or targets with this competitor. Targets that were assigned to the competitor are not removed.

5.6.5 Importing Participants

Orion has the capability to import participants from an Excel file or another Orion match file. This includes both shooters and teams. To import participants open the match participants will be imported into. Click on `Match`, then `Import`, and `Participants`. Select the Excel file or Orion match file to import from and follow the on-screen instructions.

The rules for importing participants vary depending on the type of file participants are being imported from.

5.6.5.1 Rules for Importing Participants from Excel

- Must save the file as an Excel Microsoft Office Open XML (.xlsx). Older version of Excel (.xls) may work but are not supported.
- Each row in the Excel file must represent a competitor, except the header row.
- Every competitor in the Excel file will be imported, provided the competitor has a first and last name.
- All data to import must be in the first tab (worksheet) of the Excel file.
- It is best, but not necessarily required, to have a header row with values matching the headers on the Match Competitors tab in Orion. For example, it would be best to have display names, competitor ID numbers, etc.
- Category data (e.g. 3 Position Rifle Type) is CaSe SeNSiTiVe, as are Team Names.
- A New Team will be created if a matching name is not found.

5.6.5.2 Rules for Importing Participants from an Orion Match File

- Only shooters with a competitor number will be imported.
- If the match to import to has the same competitor number as a shooter in match to import from, the shooter will not be imported.
- All information about the shooter (name, yob, city, state, and categories) will be imported.
- Teams, as well as team members will be imported.
- Scores are not imported in this process.
- All imported shooters are assigned to relay 1.

5.7 Team Management

Team management is done on the `Match Teams` tab, and only after a match is opened.

Teams are disabled for Orion at Home users. Only Orion for Club and Orion Site License users may create and use teams in their matches.

Teams in Orion are made up of other participants. A Teams score is the sum of the top participant scores from each team. Any number of team members may be added to each team. The number of team members that contribute to the team score is set in Match Properties.

Teams can be created in a number of ways.

- Clicking `Match`, then `New Team`.

- Hitting `Ctrl -T`.
- Click the New Team button .
- Scrolling to the bottom of the Team table and add a new team in the bottom row.

Once a team is created team members may be added to the team. Orion does not restrict the number of team members may be added to a team. However a competitor may only be a member of one team.

To add a team member to a match select the shooter's name in the Participant tab, then select the appropriate team from the drop down box under the team heading.

5.8 Assigning Targets to Athletes

Without any a priori knowledge when a target is scanned or loaded into Orion it is impossible for Orion to know who shot the target, the position, or the series. To solve this problem Orion relies on what it calls the "assign to" process, as in *assigning* targets *to* an athlete. The assign to process relies on data from an athlete's competitor number, how or if auto-score was started, fill-in-the bubble values on the target, and values from any barcode labels.

Within Orion there are actually lots of ways of assigning targets to an athlete. The best method to use depends on the exact nature of the competition or practice. Review Table 5.3 for a summary of these methods.

5.8.1 Text Based Competitor Numbers

Orion support both numeric and text based competitor numbers. Numeric competitor numbers work with barcode labels and some scorecard fill-in-the-bubble forms. Text based competitor numbers are typically based on the name of the athlete. They work, within the assign to process, only with target fill-in-the-bubble forms.

The following rules must be followed when using Text Based Competitor Numbers.

- Competitor numbers must be 2 to 6 characters long and only alphabetical values.
- The order of characters within the text based competitor number *does not matter*. For example, to Orion, the competitor numbers "ERICA" and "AERIC" are the same.
- Repeated characters are ignored. For example, Orion treats "JEFF" and "JEF" as the same competitor number.

Orion will automatically follow these rules when assigning name based competitor numbers (see section 5.2.4).

Method	When to Use	Sections
Auto-Score with one competitor in a match	If there is only one competitor in a match, covered in section x.x, Orion will automatically assign scanned in targets to that one competitor with Auto-Score. Position and Series depend on the filled-in bubbles on the target. Commonly used with Orion at Home.	Section 5.8.2.3 and Section 6.2.1
Course of fire specific barcode labels	Using course of fire specific barcode is best for medium to large competitions with multiple bull targets. In this method Orion prints one barcode label for each target, providing a highly reliable method for Orion to identify the athlete, position, and series. Numeric competitor numbers must be used with this method.	Section 5.8.2.2 and Section 6.2.2
Auto-Score with single bull targets	When using single bull targets, either practice or competition, it is often easiest to use an alternative method of Auto-Score. In this method, instead of relying on barcode lables to identify the athlete, you indicate the athlete at the time of starting Auto-Score.	Section 6.2.3
Fill in the bubble competitor numbers	All new and redesigned Orion targets have fill-in-the-bubble areas for competitor numbers. Targets use text based competitor numbers and scorecards use numeric competitor numbers. Using fill-in-the-bubble values is an easy replacement for barcode labels, but recommended only for practice and small competitions.	Section 5.8.1.1 and Section 6.2.2
Generic barcode labels	Generic barcode labels are best for practices. In this method sheets of an athlete's membership number, which gets used as their competitor number in a match, get printed out. The position and series must be filled in on the target.	Section 5.8.2.1
Manually assigning targets	Manually assigning targets is generally not recommend other than a method of last resort. Its best only to use this method on small number of targets and where other methods can not be employed.	Section 5.8.3

Table 5.3: Different Methods used to Assign Targets to Athletes

5.8.1.1 Fill-In-The-Bubble Text Based Competitor Numbers

When using text based or name based competitor numbers, the competitor number value may be filled in directly on the target, using the fill-in-the-bubble competitor number mark zone.

5.8.2 Barcode Labels

"Barcode Labels," as the name suggests, are return address size labels printed with a barcode then affixed to Orion targets. The barcodes are read by Orion to automatically assign the target to the correct shooter, stage, and series. Barcode lables are used properly there is no need to go through the assign to process (see section 5.8). Target identifier barcodes come in two variations, "generic" labels, and "course of fire" specific labels.

Figure 5.4: Barcode label placement
Barcode labels should be placed over the existing Competitor Number box. When using generic labels (left image) the position and stage bubbles should be filled in with a dark colored pen. Course of fire specific barcodes (right image) abbreviate the position and stage (e.g. "P1") on the label.

5.8.2.1 Generic Barcode Labels

Generic target identifier barcodes only identify the shooter, they do not identify the position or series. Shooters must fill in the appropriate bubbles, near the top left of section on Orion targets, for the position and series. Bubbles should be filled in with a dark colored pen.

Generic target identifier barcodes are most useful for training purposes when different shooters will often firing different number of targets in each position. For example, a team coach can print out a sheet of barcodes for each of his or her shooters. Then during practice, the shooter may affix the generic barcode to the target and fill in the position and series bubble for what the shooter plans on shooting that day.

Generic target identifier barcode sheets are printed using one of the Membership Field values. It is important to use the same numeric value for the shooter's competitor number in the match. Orion can be configured to do this automatically using default Competitor Numbers. Visit section 4.1.2 for more information on Membership Fields, and section 5.2.4 for information on default competitor numbers.

Orion will always print a full sheet (60 labels) of generic barcode labels for each shooter. To print a sheet of generic labels follow the steps below.

- Select the `Shooter Database` tab.
- Make sure the shooters who require printed labels have numeric values in the appropriate Membership Field.
- Select the row(s) representing the shooters. Use the control or shift keys to select multiple rows.
- Right click, select `Print Labels`, and then the Membership Field name.

5.8.2.2 Course of Fire Specific Barcode Labels

Course of fire specific barcodes identify the shooter, position, and series for the target. These work with all Orion target types, and are intended to be used in competition. Course of fire specific barcodes will abbreviate the position and stage (e.g. "P1") on the label.

Orion prints only the barcodes needed for the appropriate course of fire. For example, if the match is a 3 by 20 plug final, Orion will print 7 labels (2 prone, 2 standing, 2 kneeling, and 1 final).

To help fully utilize all labels on a sheet, the user may tell Orion on which row and column to start printing the labels on. To print a set of course of fire specific labels follow the steps below.

- Select the `Match Competitors` or the `Match Teams` tab.
- Make sure the shooter(s) or team members who require printed labels have a numeric competitor number.
- Select the row(s) representing the shooters or teams. Use the control key to select multiple rows.
- Right click and select `Print Labels`.

5.8.2.3 Barcode Labels in Matches with One Competitor

Orion at Home users will often only have one competitor in a match, namely themselves. In these instances, when there is only one competitor, barcode labels are not needed. If there is only one competitor, when a target is scaned with Auto-Score, Orion assigns the target to the one competitor. The Series and Position are assigned based on the filled in bubbles on the target.

5.8.2.4 Barcode Labels on Scorecards

Scorecards are designed to work without barcode labels. Instead athletes should fill in the appropriate competitor number and stage bubbles.

Barcode lables can be used with Scorecards. In matches with a large number of athletes preparing Scorecards for the athletes is considered a best practice. Barcode labels are prepared for scorecards exactly the same way they are prepared for traditional targets. Visit section 5.8.2.2 for more information to prepare barcode labels for a competition.

On scorecards barcode labels are placed over the Competitor Number fill-in-the-bubble area. Figure 5.5 shows an example.

Figure 5.5: Barcode label placement on a scorecard
On scorecards, barcode labels should be placed over the Competitor Number fill-in-the-bubble area.

5.8.3 Manually Assigning Targets

Matching targets to a shooter for a particular position and series is known as "target identification." Orion will automatically perform this step when using target identifier labels (see section 5.8.2). Otherwise this is a semi-manual process that has to be completed for each target.

When targets are loaded into Orion, Orion attempts to learn as much as it can about each target regarding who shot it and the position and series. In order of precedence, Orion performs the following on each target:

1. Read the barcode label for the shooter's competitor number, position, and series.
2. Read the barcode label for the shooter's competitor number.
3. Read the barcode label for the position and series.
4. Read the bubbles on Orion targets for the position and series.
5. Assume the current target was shot by the same shooter as the previous target.
6. Assume the current target was shot in the same position as the previous target.
7. Assume the current target has the same or one off series number as the previous target (depends on the course of fire).

To assign a target to a shooter follow these steps:

1. Select the `Scoring` tab.

2. Select the first target by left clicking the target in the target tree view on the left hand side of the `Scoring` tab. This will also bring up the target image on the right hand side.

3. Right click on the same target to bring up the target's pop-up menu. Select `Assign To` from the pop-up menu. Figure 5.6 shows the `Assign To` form that appears.

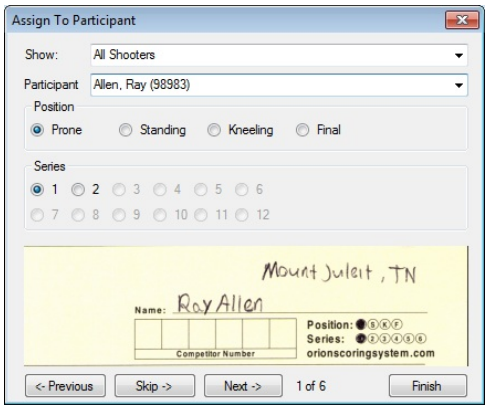


Figure 5.6: Assigning a Target to a shooter in Orion

4. If competitors are grouped by relay, select the appropriate relay from the list when working on a single relay. This will limit the competitor names listed in the Competitor list to only those who shot on the designed relay.

5. Select the target to assign by left clicking the target in the target tree view on the left hand side of the `Scoring` tab. This will display the target image on the right hand side of the screen.

6. Right click on the same target to bring up the target's pop-up menu. Select `Assign To` from the pop-up menu. The `Assign To` form will appear.

7. Within the `Assign To` form select the target's shooter from the drop down list of competitor names. Also select the targets position and series. Unless previous assigned Orion assigns the first target to prone series 1 for a three position match or standing series 1 for a standing match.

   There are four options to proceed.

   - Hit `Next ->` to accept the currently selected shooter, position, and series and change to the next target.

     If a target was originally selected from the unassigned list of targets Orion will cycle through the complete list before starting back at the first target. Once the

next target appears Orion keeps the previous shooter and position but updates the series. Verify this new information is correct then click `Next` again to advanced to the next target

If a target from a shooter was originally selected, Orion will cycle though all targets assigned to that shooter. Once the next target appears Orion displays the previous selected shooter, position, and stage for the new target. Click `Next` again to advance to the next target.

Orion will display a message once the user has cycled through all targets.

- Hit `Skip ->` to not update the currently selected target but proceed to the next target. The target's shooter, position, and series will not be updated.
- Hit `<- Previous` to accept the currently selected shooter, position, and series and go back to the previous target.
- Hit `Finish` to accept the currently selected shooter, position, and series and close the `Assign To` form.

It is possible to perform target identification while Orion is scoring.

If after target identification one or more shooter's names appear in red this is an indication that the shooter has been assigned two targets to the same position and stage. Determine which target is in error and correct it using the Target Identification process.

5.8.3.1 Series Advancement During the Assign To Process

In the `Assign To` form, for unassigned targets, when clicking the `Next` button Orion keeps the shooter and stage but increments the series number automatically (if barcode labels and bubbles where not used). Orion updates the series based on the premise that all targets from a relay's 10 or 20 shot stage were scanned in at once. For example, Orion expects to see all prone 1 and prone 2 targets together, all standing 1 and standing 2 targets together, and so on.

It is recommended that targets are kept in order of firing point and series as they come off the firing line. For example, firing point 1 prone targets 1 and 2, then firing point 2 prone targets 1 and 2, and so on. This will make the Assign To process go more smoothly.

The following table illustrates how Orion increments the series according to the course of fire and previous assigned to target.

5.8.3.2 Difference between "Mark as" and "Insert at"

When assigning targets manually there are two options for marking the series number, `Mark as` and `Insert at`. Generally speaking use `Mark as` when assigning multiple-bull targets or using Auto-Score for groups of shooters. Use `Insert at` when assigning single-bull targets or using Auto-Score for individual shooters.

The difference between the two is how Orion treats all other targets assigned to that shooter and position. When using `Mark as` Orion does not modify any other target, it only assigns the current target with the specified series number. When using `Insert at`

Course of Fire	Previous Target	Next Target after Series Increment
3 by 10	Prone 1	Prone 1
	Standing 1	Standing 1
	Kneeling 1	Kneeling 1
3 by 20	Prone 1	Prone 2
	Prone 2	Prone 1
	Standing 1	Standing 2
	Standing 2	Standing 1
	Kneeling 1	Kneeling 2
	Kneeling 2	Kneeling 1
40 Standing	Standing 1	Standing 2
	Standing 2	Standing 1
	Standing 3	Standing 4
	Standing 4	Standing 3

Table 5.4: Series Increments During the Assign To Process

Orion will increment all targets assigned to that same shooter and position that have an equal or greater than series number.

Chapter 6

Scoring

Scoring is the heart of the Orion Scoring System. Using its advanced "Visual Image Scoring" technology Orion can score quickly, accurately, and fairly.

There are two ways to score targets with Orion. Auto-Score provides a one-button automated solution for scoring. Alternatively manually scanning targets allows a user to independently scan and score each target. Auto-Score method is highly recommended when using supported scanners. When using a non-supported scanner the manual method may be better.

6.1 Scoring Accuracy

The Orion Scoring System is designed to meet or exceed the Electronic Scoring Target (EST) standards used by the International Shooting Sports Federation (ISSF) Ad hoc EST Committee. To meet these standards Orion must be used in a manner consistent with the instructions in this manual.

Orion scores both single shot holes and holes created by multiple shots. This is known as multi-shot scoring. Single shot scoring is more accurate than multi-shot scoring. Depending on the discipline Orion's multi-shot scoring accuracy may not be good enough for competition, but can still be used in practice sessions. For example air rifle and 50ft rifle competitors should only ever fire one shot per bull in a competition. In other disciplines, such as air pistol or 50m rifle, the required scoring accuracy is such that multi-shot scoring is acceptable in competitions. Orion's typical scoring accuracy is listed in table 6.1.

6.1.1 Obvious Errors

Orion's scoring algorithm does occasionally make mistakes. These are shots scored outside the allowable tolerance set by the ISSF (Table 6.1). They are commonly called "obvious errors" since when viewed within Orion, it is obvious the scored shot does not represent the physical shot. Obvious errors occur most often with multi-shot scoring and when there is a badly torn shot hole. In all instances, if there is an obvious error the stat officer (Orion user) should make a manual correction.

	Single Shot Accuracy	Multi-Shot Accuracy	ISSF Standard
Precision Air Rifle	.04-.08mm	.10-.20mm	.125mm
Sporter Air Rifle	.06-.12mm	.10-.20mm	n/a
Air Pistol	.06-.10mm	.10-.40mm	.40mm
50ft Rifle	.08-.14mm	.10-.40mm	n/a
50m Rifle	.08-.14mm	.10-1.00mm	.40mm
BB Gun	.15-.35mm	Not Supported	n/a

Table 6.1: Orion's Typical Scoring Accuracy

Correcting obvious errors, using the tools built into Orion, is part of the correct procedure for using the Orion Scoring System. Obvious errors are corrected by first removing the erroneous shot, then manually adding the corrected shot.

- First remove the shot with the obvious error using Orion's Remove a Shot (section 6.4.4) feature. The simplest way to do so is to hold down the `shift` key and double click near the center of the obvious error.
- If it is a single shot hole use Orion's Identify a Shot (section 6.4.3) feature to re-add the shot correctly. With Identify a Shot Orion uses the mouse location as a "hint" where the center of the shot is at, then looks around the surrounding portions of the image to algorithmically calculate the center of the shot. This is advantageous since the shot is still scored quantitatively. The simplest way to Identify a Shot is to double click near the center of the shot as seen within Orion.
- If it is a multi-shot shot hole, or a single shot hole that is badly torn, use Orion's Identify a Shot (section 6.4.3). Add a Shot will add a shot precisely where the mouse is located. When doing so, it may take some finesse (and trial and error) to correctly place the scored shot over the physical shot hole. The simplest way to Add a Shot is to hold down the `alt` key and double click near the center of the shot.

See Working with Targets (section 6.4) for more information.

6.1.2 Use of Scoring Gauges with Orion

The use of scoring gauges (plugs) or other manual methods of scoring paper targets (e.g. templates) is outside the correct use of the Orion Scoring System. These methods are not nearly as accurate as Orion, are often misused by stat officers, and intrinsically rely on human bias. Using these less accurate means of measuring a shot's location to check or overrule Orion's quantitative and precise measuring is simply fallacious. Furthermore the printed scoring rings are for the shooter's reference only, they may not be used to determine the value of a shot. Using a scoring gauge or other manual methods of scoring paper targets have no place with Orion and will invalidate the results.

See Manually Scoring Orion Targets (section 6.6) for more information.

6.1.3 Beta Release Technology

Scoring 5 shots per bull on Orion's 50m and 50yd. Rifle Targets is considered beta release technology. Scoring single shot holes remains accurate. Scoring shot holes where 2 or 3 shots overlap is typically accurate. However, Orion can not always precisely locate shots in 4 or 5 shot groups. To overcome this limitation statistical officers are recommended to review each target and make manual corrections if needed.

6.2 Auto-Score

"Auto-Score" is Orion's technology that automatically scores targets. Auto-Score will perform a number of steps on the user's behalf. It firsts communicates with the scanner to physically scan the targets and creates a digital image for use inside of Orion. Orion will then reads the target and assign it to the correct shooter (assuming barcode labels are in use). Finally Orion scores the targets. *Auto-Score should be used to score whenever possible*. If Auto-score does not work or is incompatible with a scanner, consult the appendix on manual scanning and scoring. A

There are three ways to use Auto-Score. The first way is to use when there is only one competitor in the match, common with Orion at Home. The second is using Auto-Score when there are multiple competitors in the match while using barcode labels. The final method is when you are using Auto-Score with multiple competitors in the match but without barcode labels. Using one method over the other depends on a number of factors, Table 6.2 provides a list of the factors and which choice is best.

Using:	**Single Shooter**	**Group of Shooters with Barcode Labels**	**Group of Shooters without Barcode Labels**
Barcode Labels	Not Recommended	Recommended	Not Supported
Multi Bull Targets	Recommended	Recommended	Not Recommended
Single Bull Targets	Recommended	Not Recommended	Recommended
Scorecards	Recommended	Recommended	Not Supported

Table 6.2: Auto-Score Recommended Usage

To use Auto-Score, the feature must be turned on. To turn Auto-Score on, click the Auto-Score button.

Auto-Score is On Auto-Score is Off

Figure 6.1: Auto-Score On and Off

Auto-Score has been tested with each of Orion's supported scanners. Support for Auto-Score is only provided for use with supported scanners. Auto-Score may work with non-supported scanners, but this functionality is not guaranteed.

6.2.1 Auto-Score for a Single Shooter in a Match

Using Auto-Score for a single shooter in a match works best when using:

- Orion at Home.
- Any tye of target or scorecatd.

To use Auto-Score for a single shooter in a match:

1. There is no need to prepare and apply barcode labels to targets or scorecards. When there is only one competitor in the match Orion will assign all targets scanned to that one competitor. The `Position` and `Series` markings should however be filled in.
2. Select the `Match Scoring` tab.
3. Load the scanner with a set of targets.
4. Click the `Auto-Score` button . Orion will scan the targets, load it into the program, assign the target to the shooter, and score. Depending on the speed of the machine Orion is installed on this may take several seconds.

   Initially the new targets will appear highlighted in green in the Target list on the left hand side of the screen. Green highlighting indicates these targets are not yet scored.

   It may be necessary to click the plus sign (`[+]`) next to `Targets`, then the plus sign next to `Relay 1`, and finally the plus sign next to the shooter's names to see the list of imported targets.
5. Repeat these steps until all targets are scored.

6.2.2 Auto-Score for a Group of Shooters with Barcode Labels or Fill-In-The-Bubble Competitor Numbers

Using Auto-Score for a group of shooters with barcode labels or fill-in-the-bubble competitor numbers works best when using:

- Orion for Clubs.
- Barcode labels or fill-in-the-bubble competitor numbers.
- Multi-bull targets from numerous shooters.

To use Auto-Score for a group of shooters with barcode labels:

1. Prepare targets with barcode labels, visit section 5.8.2 for more information. Scorecards should be prepared by filling in the bubbles identifying the athlete's competitor number on the Scorecard.
2. Select the `Match Scoring` tab.
3. Load the scanner with a set of targets.
4. Click the `Auto-Score` button . Orion will scan the targets, load it into the program, assign the target to the shooter, and score. Depending on the speed of the machine Orion is installed on this may take several seconds.

   Initially the new targets will appear highlighted in green in the Target list on the left hand side of the screen. Green highlighting indicates these targets are not yet scored.

   It may be necessary to click the plus sign (`[+]`) next to `Targets`, then the plus sign next to `Relay 1`, and finally the plus sign next to the shooter's names to see the list of imported targets.
5. Repeat these steps until all targets are scored.

6.2.3 Auto-Score for a Group of Shooters without Barcode Labels or Fill-In-The-Bubble Competitor Numbers

Using Auto-Score for a group of shooters without barcode labels works best when using:

- Orion for Clubs
- Single-bull targets.

To use Auto-Score for an individual athlete:

1. Select the `Match Scoring` tab.
2. Using barcode labels is not supported in this mode. Do not apply barcode labels or fill in the `Position` and `Series` markings on the target.
3. Load the scanner with a set of targets from one particular athlete and one particular position.
4. Select the shooter to scan and score targets for. It may be necessary to click the plus sign (`[+]`) next to `Targets`, then the plus sign next to `Relay 1`, to see the list of shooters.
5. Right click on the shooter and select `Scan Targets For` and then the position. Orion will scan the target, load it into the program, assign the target to the athlete, and score. Depending on the speed of the machine Orion is installed on this may take several seconds.

   Orion will assign the target series as the next highest series for that shooter and position.

6. Repeat these steps until all targets are scored.

If a target has a target identifier label, or has the position or series bubbles filled in, this information will override the Auto-Score process for individual shooters.

6.2.4 Auto-Score Performance

Auto-Score is both memory and processor intensive. Auto-Score by default will take up as much processing power as your computer has avaliable. It is possible, and sometimes recommended, to turn down Auto-Scores performance. To do so go to `Tools` and then `Auto-Score Performance`, selecting `High` (default), `Medium`, or `Low`. Orion has to be restarted before the new settings take effect. This setting does not effect scoring accuracy. See Table 6.3 for recommended settings.

Number of Processing Cores	Memory	Performance
1 Core	2GB or Less	Low
1 Core	More than 2GB	Medium
2 Cores	2GB or Less	Low
2 Core	More than 2GB	Medium
4 or more Cores	Less than 4 GB	Medium
4 or more Cores	4 GB or More	High

Table 6.3: Recommended Auto-Score Performance Settings

6.2.5 Auto-Score with the LiDE 700F

When using Auto-Score with the LiDE 700F Orion will open the LiDE's scanner drivers each time. This is because there are a few settings must be adjusted that Orion does not have access to via the scanner drivers.

Set the scanner drivers to the following with the 700F.

- Click the `Advanced` tab on the right hand side. It may ask if the settings should be moved to default. Click the `Do not display this message again` checkbox and click `OK`.
- `Paper Size` to `A4`.
- `Color Mode` to `Color`.
- `Output Resolution` to `300`.
- `Output Size` to `A4`.
- `Auto Tone` to `Off`.
- `Unsharp Mask` to `Off`.
- `Backlight Correction` to `Low`.

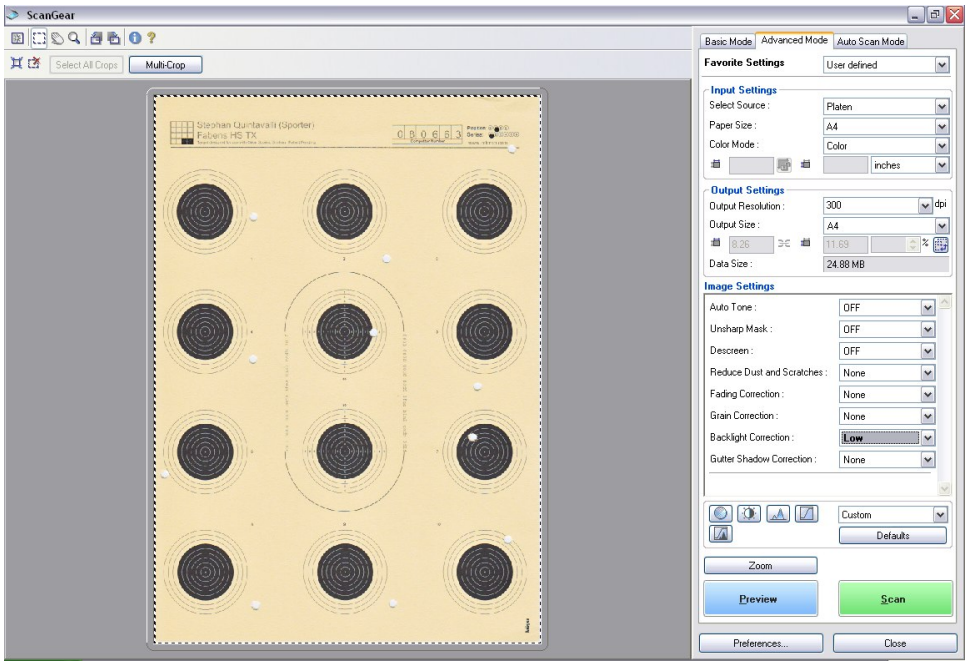


Figure 6.2: 700F Scanner Settings

6.2.6 Selecting a Scanner

Auto-Score will scan targets from any TWAIN compliant scanner (recall however Orion supports only a limited number of scanners, see Section 3.7). To select which scanner to scan with, or to change the selected scanner, click on `Match` then `Scoring` and then Select Scanner.

6.2.7 Shadow Direction

For most scanners, when targets are scanned they leave a shadow around the top or bottom portion of the bullet hole. If left unchecked the shadow can cause inaccurate scoring. Orion, if it knows the direction of the shadow, detects and compensates for it.

If you are using Orion with a non-supported scanner, it is necessary to tell Orion the direction of the shadow. Specifically if shadows are appearing at the top of the bullet hole, bottom of the bullet hole, or no shadows at all. To set this property, from Orion's menu bar, go to `Tools` and then `Scanner Shadows`.

If you are using an supported scanner, Orion automatically sets this property for you.

6.3 Scoring

Scoring is the process by which Orion locates and assigns a value to each shot on a target. A shot is identified either by a physical shot hole on the target, or a fill-in-the-bubble shot selection row.

To score physical shot holes, Orion uses a multiple pass scoring algorithm. The first pass locates the center of each aiming bull, the second pass locates the center of each shot. Orion primarily relies on the edge of shot hole to determine its center.

Scoring is a computationally intense process. Orion will use up as much of the computer's processing power as it can; other processes on the workstation may slow down. Depending on the speed of the computer used it can take 1 to 5 seconds per target to score. Air pistol targets where 4 or 5 shots are clustered together can take up to 2 minutes to score.

The scoring process runs in the background, allowing other functions such as Target Identification to be completed. However, Orion will not start any secondary scoring processes (such as protests) while scoring.

- To score all targets that have not yet been scored click the `Score Targets` button on the menu bar.
- To rescore all targets regardless if they were previously scored follow select from the `Match`, then `Score`, then `Re-score All Targets`.

6.3.1 Scoring Fill-in-the-Bubble Shot Selection Rows

Each fill-in-the-bubble shot selection row is treated as one potential shot. Orion will score the shot (the shot selection row) based on the bubble that is filled in by the user. If two or more bubbles are filled in, Orion will identify the bubble that is filled in the most. At most one shot value is allowed per shot selection row. If the user does not fill in the bubble adequantly, Orion may not identify the value. If no value is filled in Orion will not treat the shot selection row as a shot.

6.4 Working with Targets

6.4.1 Terminology Targets verses Scorecards

The term "Target" refers both to a target with aiming bulls and a target with fill-in-the-bubble shot selection rows. The former is commonly called a scorecard. To Orion, both are treated the same.

To learn how to use Oroin Scorecards, as a scorer recording scores, visit Appendix B.

6.4.2 Verification

"Verification" is the process of manually correcting any scoring abnormalities. Scoring Abnormalities can include everything from a shooter firing too many shots on a target to an obvious error. All scoring abnormalities should be corrected by the Statistical Officer before results for an event are considered final.

Orion provides tools to add and remove shots, add misses, assign penalties, rescore shots, and more to help the user resolve scoring abnormalities. Verification is performed from Orion's `Match Scoring` tab.

The Match Scoring tab is divided into three parts, the Target List, the Target Image, and the Shot List.

6.4.2.1 Target List

On the left hand side of the Match Scoring tab is the target list. This is a tree view that lists all the targets loaded into the match. Unassigned targets appear at the top of the tree view just below the Target identifier. Targets assigned to a shooter are listed under the shooter's name. Shooter's are further grouped by their relay.

Within the TargetList Orion will highlight targets or shooters with any known abnormalities. Table 6.4 lists the meanings of different colors.

Background Color	Meaning
White	Target is scored and Orion found the expected number of shots on that target.
Green	Target has not yet been scored.
Yellow	Target is scored, but Orion found more than, or fewer than, the expected number of shots.
Red	Shooter has two or more targets assigned to the same Position and Series.
Blue	Currently selected target.
italic	Target has not been viewed yet.

Table 6.4: Highlighted Target Colors and their Meanings

All highlighted targets or shooters should be resolved before printing or reporting results.

6.4.2.2 Target Image

To view a target select the target from the Target List. Once selected the target's image is displayed in the main section of the Match Scoring tab. A detailed list of shots is also displayed, known as the Shot List, beneath the Target Image.

Scored shots are highlighted in blue or red on the Target Image. The currently selected shot will appear in red all other shots appear in blue. To change the currently selected shot click near a different shot.

Multiple actions may be taken to the selected shot (shown in red), such as removing or protesting the shot.

In general to interact with the target or with the currently selected shot right click. A pop up menu will appear, providing access to a number of functions. Common actions, such as adding or removing a shot, may be done by double click in conjunction with the shift, control, and alt keys.

Mouse and Key Stroke	Action
Double Click	A shot is identified (added) using the mouse's location as a hint.
Double Click + `shift`	The nearest shot is removed.
Double Click + `control`	A miss is added to the nearest aiming bull.
Double Click + `alt`	A shot is added exactly where the mouse is located.

Table 6.5: Double Click Commands for the Current Target Image

6.4.2.3 Shot List

A detailed `Shot List` is displayed beneath the `Target Image`. Each row represents a shot. The columns refer to the following.

- `Bull`: The aiming bull number on the target.
- `Shot`: The shot number within the aiming bull.
- `Score`: The score value of the shot.
- `Penalty`: The number of penalty points, if any, applied to the shot.
- `Notes`: Additional notes about the shot.
- `X`: The x-coordinate of the shot's center. Measured in millimeters.
- `Y`: The y-coordinate of the shot's center. Measured in millimeters.
- `R`: The radial distance of the shot's center. Measured in millimeters. This value is used to derive the score value.
- `Size`: The area of the shot hole, measured in millimeters squared.
- `Confidence`: A metric indicating the amount of tearing around the shot hole.

6.4.3 Adding Shots

Although rare, there are circumstances that will cause Orion to not find a shot on the target. This may be due to a number of reasons.

- Orion only looks for shots within a pre-set distance from the aiming bull (at least out to the 1 ring). If a shot is beyond this distance Orion may not find it.
- Shot holes that are ragged (have unusual tearing) may not be found. This is common for poorly maintained air rifles and air pistols (velocities below 450 feet per second). Torn or irregular shot holes are evidence of low velocity.

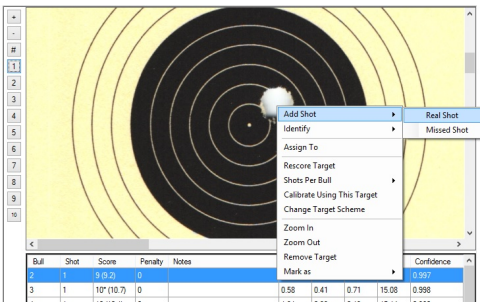


Figure 6.3: Adding and adjusting shots after right clicking

- If there are more than the expected number of shots on a bull Orion may not find the additional shots.

To compensate Orion allows the user to either "add" or "identify" shots to the target. To add a shot:

1. Select the target in the target list.
2. Zoom in to the appropriate aiming bull.
3. Point the mouse at the center of the shot. Do a right click and select `Add Shot`.

Locating a shot means the user giving Orion a hint as to the location. Based on the hint, and the available shot hole, Orion will calculate the center of the shot.

1. Select the target in the target list.
2. Zoom in to the appropriate aiming bull.
3. Point the mouse at the center of the shot. Right click and select `Locate` and then `1 Shot`.

The locate feature may also be used to let Orion identify shots in a multi-shot group.

If there are numerous shots that were not found, or Orion appears to be scoring erratically rerun calibration (see section **??**) then rescore all the targets.

6.4.4 Removing Shots

Although rare, there are circumstances where Orion will find a shot that does not exist. This is most often caused when shots overlap or a shot hits the target at an angle.

If there are numerous fictitious shots or Orion appears to be scoring erratically the system will need to be recalibrated. (see section section **??**) Following this rescore the targets.

In other circumstances Orion allows the user to remove shots from the target if necessary. To remove a shot:

1. Select the target in the target list.
2. Zoom in to the fictitious shot that Orion found.
3. Select the shot and make sure it is highlighted (shot hole will turn red). Right click and select `Remove Shot`.

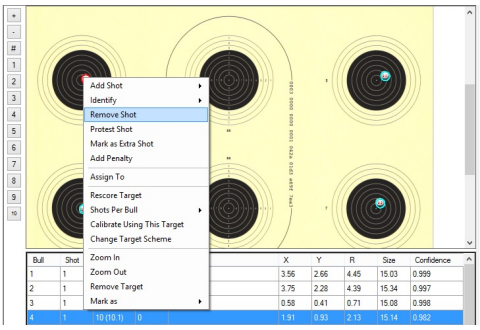


Figure 6.4: After selecting bull 4, right-clicking will allow the user to adjust or remove the shot.

6.4.5 Shot Selection Rows

At most one value may be selected for each shot selection row. Orion will highlight the selected value on screen.

- To change a value, double click over the new value.
- To remove a shot, select the shot, right click, and click on `Remove Shot`.

6.4.6 Extra Shot fired by the Shooter

Occasionally shooters will fire more shots on a target than allowed by the course of fire. Accord to most rule books if a shooter fires extra shots the shot should not be removed, but rather marked as an extra shot which penalizes the shooter.

To mark a shot as an extra shot fired by the shooter:

1. Make sure all targets for the particular position have been assigned to the shooter.
2. Select the target in the target list.
3. Zoom in to the extra shot. Most rule books specify the highest value shot on the target is the extra shot.
4. Select the shot and make sure it is highlighted (shot hole will turn red). Right click and select `Extra Shot`.

After a shot has been marked as an extra shot, Orion will annul that shot, then apply a 2 point penalty to the lowest value shot in the series.

Because most rule books specify only a jury member (and not an EST) can assign a penalty Orion does not automatically assign shots as being extra shots (and thus will not automatically penalize the shooter)

6.4.7 Internal Cross-Fires

Internal cross-fires is when the shooter fires more than the perscribed number of shots on a single aiming bull. The intracacies of what is an internal cross-fire verses an extra shot fired, as well as their penalties, are rulebook dependent. In most cases if a shooter fires an internal cross-fire he or she should fire fewer shots on the next aiming bull. And again, in most cases, the shooter is allowed two internal cross-fires before he or she is penalized. The BB Gun and Benchrest rulebooks are notable exceptions.

Using the BB Gun or Benchrest rulebook when a shot is marked as an internal cross-fire the shot is penalized 1 point, which is according to the respective rulebooks. All other rulebooks Orion does not automatically access a penalty. If the shooter should be penalized for excessive internal cross-fires these penalties have to be manually adjusted.

6.4.8 Applying Additional Penalties

In a competition jury members may decide to penalize shooters for a multitude of reasons. Firing a shot in the preparation period, too many internal cross-fires, unsportsmanlike conduct, and other reasons may require a penalty. Regardless of the penalty points may be deducted from the shooter as decided by the jury.

The most common penalty in a competition is when a shooter fires too many shots in a stage. This penalty is handled by Orion using the extra shot fired functionality (see section 6.4.6). for all other penalties follow the procedure below. Note that all penalties must be applied to a specific shot.

1. Select the `Match Scoring` tab.
2. Select the shooter and the target to apply the penalty to.
3. Select the shot (the shot will turn red) to apply the penalty to.
4. Right click and select `Add Penalty`.
5. In the `Penalty Form` fill in the required information and click `Save`.
    - **Rule Reference** is the rule number from the rule book that justifies the penalty.
    - **Penalty Points** is the number of points to deduct from the shooter's score.
    - **Description** is a brief explanation for the penalty.

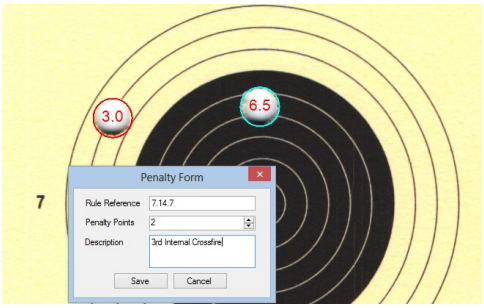


Figure 6.5: The penalty form being filled in after a common issue.

6.4.9 Rescoring Targets

When adding, removing, or marking extra shots it is possible to make a mistake. Although Orion does not have an "undo" feature the user may have Orion remove all shots from a single (or multiple) target and rescore the targets electronically.

To rescore a single target select the target from the target list, do a right click, then select `Re-score Target`.

To rescore all targets select `Match`, then `Score`, then `rescore All`.

In some rare cases if it is suspected that Orion did not score a target with a high enough level of accuracy it is permissible to rescore the target using the protest algorithm (see section 6.7). The protest scoring algorithm uses an enhanced method that can lead to better scoring accuracy. Because this algorithm takes longer to run it is not recommended for use unless a shooter protests a shot or there is an obvious error by Orion.

6.4.10 Shooting Multiple Shots Per Bull

To save on the cost of targets, Orion allows multiple shots per bull for practice purposes. Shooting 2 shots per bull for Air Rifle, BB Gun, or 50ft Rifle should only be done in training. Shooters may shoot up to 5 shots per bull in competition for Air Pistol.

When scoring, Orion expects to find the specified number of shots per bull. Orion will find more than the expected number of shots per pull if there is sufficient evidence of additional shots, or find fewer shots per bull if shot holes overlap too closely (or the shooter simply did not fire the expected number of shots on that bull).

6.4.10.1 Specifying the Expected Number of Shots per Bull

Within Orion the user may specify 1) the default expected number of shots per bull for the match, 2) the expected number of shots per bull for each shooter, or 3) the expected number of shots per bull for each target.

- To change the match's default number of shots per bull bring up the `Match Properties`. This is the value Orion will use for each new target loaded into Orion.

- To change the expected number of shots per bull for a shooter, in the `Match Scoring` tab select the shooter's name, right click, and select the `Shots per Bull`. This will only effect the targets currently assigned to that shooter.
- To change the expected number of shots per bull for a individual target, in the `Match Scoring` tab select the target, right click, and select the `Shots per Bull`.

6.4.10.2 Multiple Shots per Bull on Benchrest Targets

Orion can only score one shot per bull on the 25m Benchrest and 50m Benchrest targets. If an athlete fires more than one shot on an aiming bull Orion will only find one of the shots. The remainder of the shots have to be added by hand.

6.4.11 Removing a Target

If a target was added to the image directory erroneously and needs to be removed select the target, right click, and select `Remove Target`.

The target may be either removed from Orion permanently, or removed temporarily. Removing a target permanently will mark the file name of the target image in such a way that Orion will no longer list it. Removing a target temporarily will remove the target from the match, but will permit the target to be re-loaded next time images are loaded.

Deleting an target image file outside of Orion should only be done if the target was first removed from Orion. Orion may report an error if it can not find a target image file that was loaded previously.

6.4.12 Scoring Tests

A "Test" is a special type of scorecard. Scorecards have predefined values for each fill-in-the-bubble option, that can not be changed by the user. In a Test, the statistical officer (the Orion user) tells Orion the correct answer. Orion then assigns each correct answer equal value, not to exceed 100 points on a test. Currently the only avaliable test is Orion's BB Gun Test Answer Sheet.

1. Complete a master answer sheet, using one of the same type of test scorecards. Only fill in an answer where there is a question. For example, if there are 20 questions on the test, only fill in a bubble for the first 20 answers on the test scorecard. Leave the remaining answers blank.
2. Scan the master answer sheet into Orion using Auto-Score. The master answer sheet may either be left unassigned, or should be assigned to the statistical officer.
3. In Orion's `Match Scoring` tab, select the master answer sheet. Right click on the scorecard image, and select `Set as Answer sheet`. This tells Orion what the correct answers are to each question.
4. The competitors' test scorecards may be scanned in. Orion will score the scorecard based on the master answer sheet.

The master answer sheet may be selected at any time. However it is recommended to scan the master answer sheet first, before any competitor's answer sheet is scanned in.

Orion assigns an equal value to each question. Each test is worth at most 100 points. For example, if there are ten questions Orion assigns 10 points to each correct answer. If the number of questions is not evenly divisible by 100, Orion will assign the highest value of points to each question such that the total value of the test does not exceed 100. For example, if there are 11 questions, Orion will assign each correct answer 9 points, for a total possible score of 99.

6.4.13 Rescanning a Target

In general a target should never be rescanned. The only reason to rescan a target is if the target image has an obvious deformity. If this occures, remove the target from Orion, then rescan.

6.4.14 Changing the Target Scheme

Orion automatically reads the target scheme when a target image is loaded into the program. In some remote instance Orion may incorrectly identify the type of target, and thus score the target incorrectly. This may be caused by the bar code, in the upper left corner, is torn, written on, or otherwise damaged.

When viewing a target in Orion, it displays the type of target scheme it identified at the top of the screen. Figure 6.6 is an example.

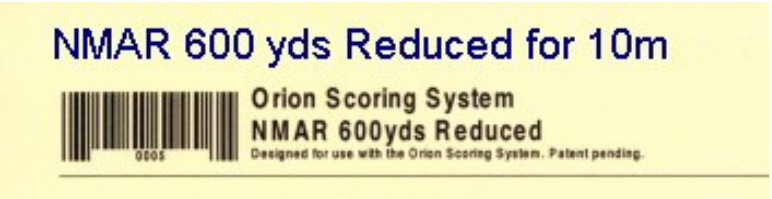

NMAR 600 yds Reduced for 10m
Orion Scoring System
NMAR 600yds Reduced
Designed for use with the Orion Scoring System. Patent pending.

Figure 6.6: Target Scheme Identification

To change a target's target scheme:

1. Select and right click on the target.
2. In the pop up menu select `Change Target Scheme`.
3. In the new form, select the correct target scheme and click `OK`.

Orion will rescore the target using the new target scheme.

6.4.15 Compressing Target Image Files

In order to achieve accurate scoring Orion orginally scans and saves target image files in a "lossless" format. Doing so consumes a lot of disk space. At the conclusion of a match, after all scoring is complete, Orion can compress the target images. The new files are about 15% of the original size. Compressing files allows you to view the targets within Orion, however they will be unsuitable for accurate scoring or rescoring.

To compress the target image files within a match, from Orion's menu bar click on `Match` then `Score` and then `Compress Targets`.

6.5 Working with Reentry Matches

In an "Reentry Match" an athlete may shoot the same course of fire (the same match) multiple times, and Orion will only count certain scores, discarding others, based on the match's reentry configuration. The most common reentry configuration is counting only the athlete's hightest aggregate score.

Visit Section 5.2.1.6 for more information on setting the reentry configuration.

The key to managing a reentry match is understanding "reentry tags." A reentry tag allows Orion to group targets together that an athlete shot at a single time. Stated another way, each time an athlete (or group of athletes) shoot a reentry match a new reentry tag is needed. In most cases Orion will manage reentry tags for you; the default reentry tag is simply today's date (e.g. 20150105).

6.5.1 Specifying the Reentry Tag

Each set of targets an athlete shoots in a reentry match needs to have a unique "reentry tag." Each time Auto-Score is ran, or targets are loaded fromo a directory, Orion assigns those targets the reentry tag in the `Reentry Tag` text box. The `Reentry Tag` text box is located on the menu bar, and only for reentry matches.

The default reentry tag is a text string representing today's date, for example "20150122" (for 22 January 2015). Any text string may be a reentry tag. All targets have a reentry tag. Targets in non-reentry matches are assigned a empty string "".

6.5.1.1 Changing a Target's Reentry Tag

A target's reentry tag may be changed in the `Assign To Participant` form.

6.6 Manually Scoring Orion Targets

Manually rescoring a shot (using a plug or other means) on an Orion target will invalidate the competition results. Orion is an electronic scoring system and evaluates shooters on a uniform quantitative standard. Attempting to rescore a target using a plug and human interpretations means shooters are no longer treated equally.

Precedence for uniform electronic scoring of paper targets was established in 1986 by the International Shooting Sports Federation (ISSF). 1986 was the year the ISSF first approved a target reading machines for Olympic scoring. The ISSF recognized that mixing electronic and manual scoring standards would create a patchwork of result quality, giving some shooters an unfair advantage over other shooters. To prevent this from occurring the ISSF mandated that if electronic scoring systems were used in a competition, then all shooter's targets must be scored with that system. Since then ISSF recognized national federations have adopted the same principal, including USA Shooting and the German Shooting Federation.

Orion's scoring methodology is fundamentally different from that of manual scoring. Orion scores by electronically comparing the calculated center of the aiming bull and the calculated center of each shot. Manual scoring involves a human comparing the outside edge of a scoring ring with the inside edge of a shot hole. In making its scoring calculations, Orion takes into consideration the entire circumferences of the aiming bull and shot hole. Manual scoring, on the other hand, compares a single point on the outer edge of a scoring ring with a single point on the inner or outer edge of a shot hole or scoring gauge. As electronic and manual scoring are two different methods of scoring it is not valid to use one method to recheck the scores produced by the other method. Furthermore, manual scoring is less accurate than Orion; it is illogical to use a less accurate method to check the accuracy of a more accurate method.

A primary advantage that Orion has is that it evaluates all shots fired by all shooters by using the same standard. No shooter is given a scoring advantage or disadvantage due to human interpretations. In order to have consistent manual scoring for all shooters in a competition, it would require absolutely identical printed targets, absolutely identical scoring plugs, and absolutely unbiased and correct judgments by scoring officials.

All scoring systems introduce some degree of error into the scoring process. It is simply impossible to create a "perfect target" scored with absolute precision. However, a scoring system like Orion comes exceptionally close to this standard by measuring all shooters' shots equally with an evaluation system whose tested and theoretical accuracy is better than that of nearly all electronic targets or manually scored paper targets.

6.7 Protest Procedures

In Orion a "score protest" or sometimes referred to as a "challenge" is done using a more accurate and time intensive algorithm on the digital shot hole in question. Protests only occur on a correctly scored shot. Before protesting the shot the stat officer (Orion user) should determine if an obvious error (section **??**) was made. If so, and in all circumstances, obvious errors should be corrected by the stat officer.

It is widely regarded as unsportsmanlike for a shooter to protest a correctly scored shot. The only reason a shooter would do so is if he or she is trying to game the system by having a slightly different algorithm rescore the shot in hopes that the shot value goes up. For more information on this subject visit www.orionscoringsystem.com

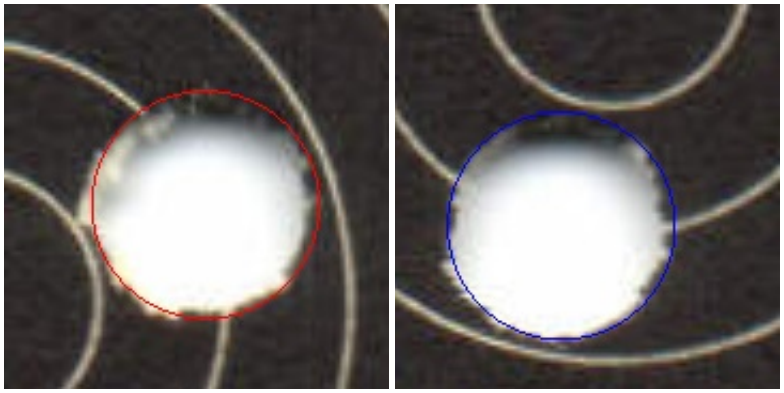
To properly conduct a protest, after the regular scoring is complete, follow the procedure below.

1. The statistical officer posts the results and provides the shooters with their targets and individual score sheets. Individual score sheets may also be made available online. These results are considered final unless protested by the competitor.

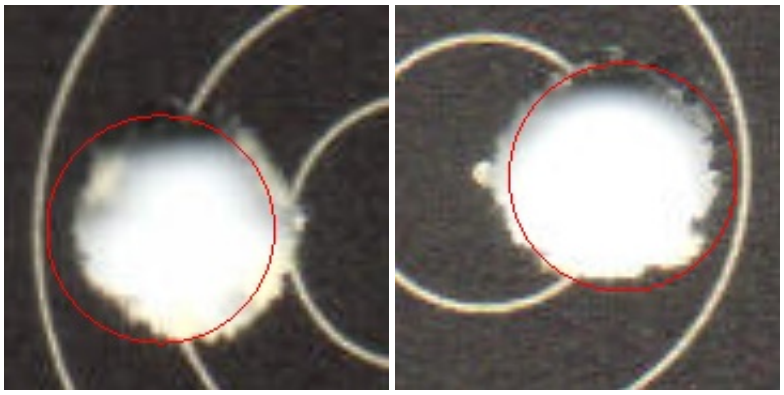
2. During the challenge period a competitor may ask the statistical officer to view questionable shots within Orion. If the statistical officer concludes there was an obvious error he or she may make a manual correction without a formal protest.

   If the statistical officer concludes the shot hole was found with a reasonable interpretation, in other words a correctly scored shot, the shooter may then protest the value of the shot.

   Figure 6.7 show examples of obvious and non-obvious errors specifically for air rifle targets.



Non Obvious Errors - Statistical Officer should not correct manually.



Obvious Errors - Statistical Officer may correct manually.

Figure 6.7: Examples of obvious and non-obvious errors.

3. To protest the shot first select the shot within Orion (the shot turns from blue to red), right clicks on the shot, and select `Protest Shot`." The `Protest Shot` option will run a more comprehensive scoring algorithm on that individual shot, it may take several seconds to return.

4. After a few seconds Orion will return with the results, either a `Protest Won` (the shot value went up) or `Protest Lost` (the shot value remains the same) message.

5. If the protest was not successful a 2 point penalty may be assigned to the shooter. Competitions sanctioned under the National Three-Position Air Rifle Council or USA Shooting must penalize the shooter with a 2 point penalty for each lost protest per their respective rule books.

Not all shots can be protested. Shots in a multi-shot group can not be protested. Shots added or identified can not be protested. Shots in a Benchrest match can not be protested. And shots can not be protested when decimal scoring is used.

6.7.1 Protest Observations

- Obvious errors should be corrected without the need to file a protest.
- Orion is not recalibrated. Unless Orion is scoring erratically, the same calibration values should be used throughout a match this includes any protests.
- The protested target is not rescanned. Each target is only scanned once during a competition. A target is only rescanned in the rare instance that there is an obvious deformity in the scanned target image.
- The scoring rings printed on the target are never used to determine the value of a shot. The scoring rings are for the shooter's reference only.
- A plug can not be inserted into any shot hole to help determine the value of a shot.

6.8 Importing Scores

Orion has the capability to import scores from another Orion match file. It is not possible to import general scores from other types of files. Orion can however import "Test" scores (for a BB Gun match) from Excel.

6.8.1 Importing Scores from Orion

The rules for importing scores "Match A" into "Match B" are as follows.

- Match A and Match B must have been created with the same rule book and course of fire.
- Scores for a competitor from Match A will be imported into Match B only if that competitor previously exists in Match B. Competitors are matched using competitor numbers (not by name).
- Scores for a competitor from Match A without a competitor number will not be imported into Match B.

- If a competitor in Match B already has a score, his or her scores will be overridden with the scores from Match A.

To import scores from "Match A" into "Match B" open Match B in Orion. Then click on `Match`, then `Import`, and finally `Scores`. Select the match file for Match A. The scores will then be imported.

6.8.2 Importing Test Scores from Excel

The rules for importing test scores are as follows.

- Must save the file as an Excel Microsoft Office Open XML (.xlsx). Older version of Excel (.xls) may work but are not supported.
- The Excel file must have a header row.
- The Excel file must have a column representing Competition Number and Test Score. It may have other columns but these will be ignored.
- Orion uses Competitor Number to match shooters to the imported test score. If the competitor number is not found, Orion does not import the test score.
- The test score must be a numeric value between 0 and 100.

To import test scores click on `Match`, then `Import`, and finally `Test Scores`. Select the Excel file to import from, and then match the Competitor Number and Test Score columns.

Chapter 7

Results

Generating results is the third major step in match administration. Results are based on the scores calculated by Orion and the applicable rulebook's ranking order.

Orion by default generates a rich set of result lists, depending on the rulebook and options selected within Match Properties (see Section 5.2). Result options in general include overall individual and team results, individual qualification results, and individual and team stage results.

7.1 Displaying Results

Orion can display two type of results in-program, ranked results of athletes and teams, or shot groups of individual athletes.

7.1.1 Displaying Ranked Results

Ranked results is an in-order list, by score, of all athletes or teams for a specific event and category. The available Events (e.g. "Individual," "Team," and "Standing") are controlled by the selected course of fire. The categories (e.g. "Sporter" or "Precision") is controlled by the category selection. Both are set in Match Properties (see Section 5.2).

Displaying ranked results is available on the `Match Results` tab. Select the result to view using the drop-down list under `Ranked Results`. Click `Update Results` to view the results on screen. Click `Print Result` to print.

In a reentry match, only those scores that count towards a participants score are listed. For example, in a `Highest Score from EVENT` reentry match, only an athletes highest aggregate score gets listed. His or her other scores are not displayed in the result list.

7.1.2 Shot Groups

Orion provides in-program shot-group analysis via the `Shot Group Form`. Shot group analysis is a statistical representation of an athlete's shot group and a powerful coaching tool. There is both a graphical display and quantitative values. Visit Section 7.3 for more information on shot group analysis.

To open the Shot Group Form click the Shot Group Form button (blue circle with white cross-hairs). To view a shot group click on any of the results within the Match Results tab.

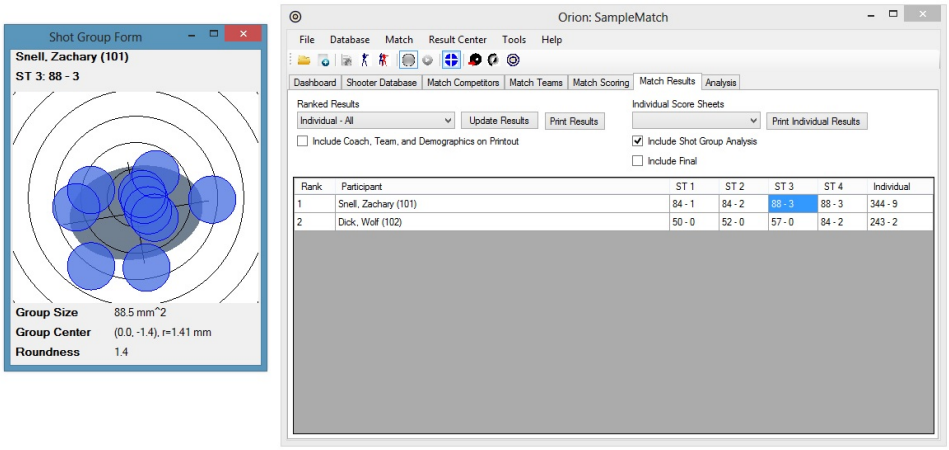

Shot Group Form
Snell, Zachary (101)
ST 3: 88 - 3
Group Size 88.5 mm^2
Group Center (0.0, -1.4), r=1.41 mm
Roundness 1.4
Orion: SampleMatch
File Database Match Result Center Tools Help
Dashboard Shooter Database Match Competitors Match Teams Match Scoring Match Results Analysis
Ranked Results
Individual - All
Update Results
Print Results
Include Coach, Team, and Demographics on Printout
Individual Score Sheets
Print Individual Results
Include Shot Group Analysis
Include Final
Rank Participant ST 1 ST 2 ST 3 ST 4 Individual
1 Snell, Zachary (101) 84 - 1 84 - 2 88 - 3 88 - 3 344 - 9
2 Dick, Wolf (102) 50 - 0 52 - 0 57 - 0 84 - 2 243 - 2

Figure 7.1: The Shot Group Form.

7.2 Printing Results

There are two types of results available to print. Either ranked aggregate results for individuals and teams, or individual score sheets specific to a single athlete. Both options are available on the Match Results tab.

7.2.1 Printing Ranked Results

Ranked results is an in-order list, by score, of all athletes or teams for a specific event and category. The available Events (e.g. "Individual," "Team," and "Standing") are controlled by the selected course of fire. The categories (e.g. "Sporter" or "Precision") is controlled by the category selection. Both are set in Match Properties (see Section 5.2).

Printing ranked results is available on the Match Results tab. Select the result to print using the drop-down list under Ranked Results. Click Update Results to view the results on screen. Click Print Result to print.

The following options are available when printing ranked results.

- Include Coach, Team, and Demographics on Printout will include the athlete's coach's name, team name, organization, and hometown if entered within Match Competitors.
- Include Equipment is available for some rulebooks. If available, it will include the equipment the athletes used in competition and entered within Match Competitors.

7.2.2 Individual Score Sheets

An individual score sheet lists each shoot a individual fired, its score, radius, and x and y position. For each ten shot series Orion also displays the shooter's shot group in graphical form.

To print a single shooter's individual score sheet select the shooter's name from the drop down list in the `Results` tab, and click `Print`. To print all shooters from a specified relay's individual score sheet select the relay from the list and then click `Print`.

The following options are available when printing individual score sheets.

- `Include Shot Group Analysis` will include graphical and quantitative values of the shooters shot group. This is enabled by default.
- `Include Final` will include the athlete's Finals score, if available.
- `Obfuscate Results` will found the X, Y, and radial values to 1mm and not include decimal values of shots when integer scoring is used.

When printing individual score sheets in a reentry match Orion will ask which reentry tag to use. Select one or multiple tags to print.

7.3 Shot Group Analysis

"Shot Group Analysis" is an exciting feature, found only in Orion, that helps shooters better understand how they are shooting. When a shooter only shoots one shot per aiming bull it is difficult for him or her to know if his or her group is centered, what shape the group is in, or how big or small the group is. Shot group analysis uses statistical analysis techniques to calculate and display a shooter's core group.

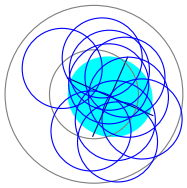
Score is only one method for a shooter to know how well he or she is doing. Score alone does not tell a shooter or coach much information about what needs to be improved. Alternatively, shot group analysis can tell a shooter where his or her group is centered, if the group round or elongated, and how large the group is. Orion displays this information both graphically and analytically in the individual score report or the in-program shot group form.

Figure 7.2 is an example of a individual score report with shot group analysis turned on.

Consider the following information that can be learned from this report.

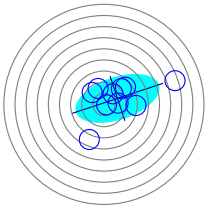
- In prone, the shooter has a very round group (Roundness factor of 1.08) typical of a solid well built position. However, due to the size of the group, the athlete may benefit from better ammunition or cleaning his rifle.
- In standing, the shooter had two outliers from his main group. Outliers like this could have many causes, including shooting too quickly without an adequate pre-shot routine, over holding, or fundamental position problems. Its important to talk with your athlete to help determine the root cause.

7th Brigade Air Rifle
Murray, Chris (204583): 269 - 9
Wednesday, 10 March 2010



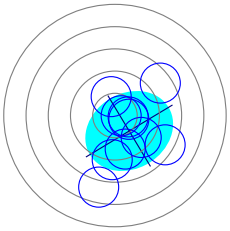
Shot	Score	X Pos.	Y Pos.	Radius
P1	9	1.33	-2.68	2.99
P2	9	2.70	-1.39	3.04
P3	10*	1.74	0.96	1.99
P4	10	-0.17	-2.06	2.07
P5	10	0.46	2.05	2.10
P6	10*	1.94	-0.16	1.94
P7	10*	0.87	1.35	1.61
P8	10	-1.78	1.45	2.30
P9	10*	0.83	0.59	1.02
P10	10*	1.20	-1.48	1.91

PR 1: 98 - 5
Group Center: (0.91, -0.14)
Group Area: 16.96
Group Roundness: 1.08



Shot	Score	X Pos.	Y Pos.	Radius
S1	8	3.90	3.54	5.27
S2	9	3.17	0.30	3.19
S3	9	2.04	2.38	3.13
S4	8	7.21	-0.23	7.21
S5	4	15.99	5.34	16.85
S6	9	-2.66	2.67	3.77
S7	7	-3.29	-7.88	8.54
S8	9	-1.32	3.59	3.82
S9	10*	0.58	-0.10	0.59
S10	8	4.85	3.88	6.21

ST 1: 81 - 1
Group Center: (3.05, 1.35)
Group Area: 148.24
Group Roundness: 2.05



Shot	Score	X Pos.	Y Pos.	Radius
K1	9	1.15	-3.76	3.94
K2	8	5.11	3.65	6.27
K3	10*	1.56	-0.42	1.61
K4	10	-0.43	2.13	2.17
K5	9	2.95	-2.46	3.84
K6	10*	1.48	-0.15	1.49
K7	8	5.64	-3.29	6.53
K8	7	-1.83	-8.05	8.25
K9	9	-0.31	-4.97	4.98
K10	10*	0.70	-0.02	0.70

KN 1: 90 - 3
Group Center: (1.60, -1.73)
Group Area: 68.57
Group Roundness: 1.22

ORION
SCORING SYSTEM

Figure 7.2: An individual score sheet for a shooter.

- In kneeling, the shooter has a fairly round group but is centered off at the edge of the nine ring. He could of have a few extra points by paying more attention to his sighters and correlating his called shots with his actual shots and then making appropriate sight adjustments.

Shot group analysis provides the following information:

- Graphically, the light shaded blue ellipse is the shooter's statistical representation of his or her group. It displays the area that 90% of a shooter's shots were statistically located within.

- The lines within the shot group ellipse are the major and minor axes, and correspond to the center of the group.
- "Group Center" is the statistical center of the shot group. The first number is the X-coordinate center, the second number if the Y-coordinate center. Both numbers are in millimeters. Group Center is largely influenced by the athlete's ability to center his or her group, that is, calling shots and making appropriate sight adjustments to the actual shot location.
- "Group Area" is the size of the statistical representation of the shot group. It is also the size of the shot group ellipse. This is measured in millimeters squared. Group Area is largely influenced by the athlete's inner position (the static muscular forces used to hold the gun still) and gun ammo combinations.
- "Group Roundness" is a unit-less metric measuring how round the shot group is. A shot group with roundness 1.00 is perfectly round. A roundness value greater than 1 is more elongated along the X-axis, less then 1 the group is more elongated along the Y-axis. Groups with a roundness between .75 and 1.50 may generally be considered round. Group Roundness is mostly influenced by an athlete's outer position. The more well built a position is the more round the group will be. In pistol shooting groups elongated along the Y-axis are usual indicative of poor sight alignment.

7.4 Interpreting Scores Printed by Orion

Orion reports scores in many different formats. The exact format depends on the match, its configuration, and what exactly Orion is reporting. Below is a guide to the different types of formats and their meaning.

- **Series and Aggregate Scores: Integer Scoring**
  Example: 383 - 8
  Example: 94 - 3
  This is the most common score format. The first number is the whole number or integer score the shooter received. The second number, after the dash, is the number of inner tens the shooter received.
- **Series and Aggregate Scores: Decimal Scoring**
  Example: 391.4
  Example: 98.2
  When decimal scoring is used, this is the shooter's aggregate where every shot is scored with decimal (tenth ring) precision. Final scores are always reported in decimal. When integer scoring is used, aggregates that include a Final are the sum of the integer score from qualification plus the decimal score of the final.
- **Single Shot Scores: Integer scoring**
  Example: 10*(10.4)
  Example: 8(8.6)^

The first number reported is the shooter's integer score. This is the official score. The number in the parenthesis is the decimal score of the shot, unofficial, and used only as a reference by the shooter. An asterisk indicates the shot was scored as an inner ten. A caret symbol after the score indicates the shot was manually modified by the statistical officer.

- **Single Shot Scores: Obfuscated Integer scoring**
  Example: 10*(10.#)
  Example: 8(8.#)^
  Similar to normal Integer scoring, the first number represents the integer score, this remains the official score. The decimal value in parenthesis is obfuscated. This is to help prevent athletes and coaches who try to use this information in deciding whether or not to protest the shot value, a practice that is considered unsportsmanlike. A caret symbol after the score indicates the shot was manually modified by the statistical officer.

- **Single Shot Scores: Decimal Scoring**
  Example: 10.4
  Example: 8.6^
  When decimal scoring is used, only the decimal score is reported. This is the official score the shooter received on the shot. Inner tens are never reported, and a caret symbol after the score indicates the shot was manually modified by the statistical officer.

7.5 Exporting Results as Data Files

Orion can export a match's results to comma delimited (csv) text files. You may either export a specific results data, or export all data within the match. The generated file can be open by most spreadsheet applications such as Microsoft Excel or Google Sheets.

7.5.1 Exporting Ranked Results Data Files

Exporting a ranked resutls data file is available on the `Match Results` tab. Select the result to export using the drop-down list under `Ranked Results`. Click `Update Results` to view the results on screen. Click `Export Results` to generate the data file. Orion will save the file to disk and attempt to open the file on your computer.

Ranked result data files contain the exact same information as viewed from within Orion on the `Match Results` tab.

7.5.2 Essential and Comprehensive Data File

Orion's ranked results data files contain the same information as the printed results. Many match directors may require additional competitor or score information to be printed on their result bulletins. If this is true Orion's Essential or Comprehensive Data File may be used.

The Essential data file contains all athletes and teams name and category data, and all score data. The Comprehensive data file includes this plus shot group analysis information. Orion generates both files as csv files and tries to open them on your computer.

To generate and open the essential data file click on the "Essential Data File" button. This button is located on the button tool strip just below the menu bar, it looks like a file with a green arrow. Alternatively, from the menu bar click on `Match`, then `Export Results`, and then `Essential Data File`.

To generate and open the comprehensive data file, hold down the shift key and click on the "Essential Data File" button. Alternatively, from the menu bar click on `Match`, then `Export Results`, and then `Comprehensive Data File`.

7.6 Reporting Scores to the Civilian Marksmanship Program

When using Orion to conduct a match sanctioned by the Civilian Marksmanship Program (CMP) and governed by the National 3-Position Air Rifle Council rule book the user has the option of reporting scores at the conclusion of the match electronically to the CMP. The CMP tracks all scores fired in sanctioned matches through their Competition Tracker (CT) online application clubs.odcmcp.com. When reporting scores electronically to the CMP Orion is in fact communicating directly with CT.

To report scores electronically the match director or statistical officer (the Orion users) has additional requirements to fulfill.

- All shooters in the match must have a pre-existing CMP competitor number. The CMP competitor number is unique to each shooter and is typically 5 or 6 numeric characters long.

  A shooter may register for a CMP competitor number at clubs.odcmp.com/cgi-bin/register. There is no fee to register. Due to privacy concerns the CMP does not permit looking up or creating a shooter's CMP competitor number from within Orion.

- The CMP competitor number must be used as the Orion competitor number for all shooters.

- The `Rifle Type` Category must be used within the Orion match. If `Rifle Type` is not used Orion will assume all shooters and teams are Sporter and submit scores to the CMP as such.

- The CMP "Match ID" and "authentication code" must be supplied to Orion in the Match Properties form (see section 5.2). The match id and authentication code will be provided to the match director after the CMP sanctions the match. Contact the CMP if this information is not provided

  The authentication code is an eight character random string unique to each CMP match. It is used by CT to verify the identity of the match director. It is important not to share the match's authentication code with anyone. Treat it as a password.

- The Orion match must have the same course of fire (either 3 by 10 or 3 by 20 with or without a final) as the match sanctioned and approved by the CMP.
- The computer running Orion must have Internet access.
- The match director must still submit a report to the CMP and pay applicable fees. In addition the match director must submit a statement stating that he or she has verified as correct the scores posted on CT for the specified match.

Electronically reporting scores to the CMP should only be done at the conclusion of the match and after all scores within Orion are correct.

To submit scores to the CMP select `Match`, then `Export`, then `CMP Upload` from the menu bar. Orion will try to communicate with CT and transfer all scores from the match. This process may take a few minutes, depending on the number of shooters and Internet connection speeds. Orion will report the successful upload or any errors it encountered.

When uploading scores to CT be aware that any existing scores from the specified CT match will be overwritten by the scores currently being uploaded.

Chapter 8

Result Center

Result Center is the Orion website that users may use to post results of Orion matches. Result Center's URL is www.orionresults.com.

Result Center will allow users to:

- Post live results of Orion matches on the Internet.
- Let parents, friends, other shooters watch the results of competition on the Internet.
- List competitions online so other shooters and coaches may find them.
- Search for competitions to compete in.

8.1 Enabling the Result Center

To use Orion's Result Center, first enable the service online at www.orionscoringsystem.com.

1. Go to www.orionscoringsystem.com and click `Log In`. Users should use their Orion license number and password to log in.
2. Click on `Result Center Settings`.
3. Be sure to read and agree to Result Center's Terms and Use.
4. Check the `Enable Orion Result Center` box.
5. Update or set the team's URL path. This will be the quick URL that may be used to go to the team's home page.

6. Optionally, check the `Automatically Make Visible New Matches Created by Other Users` and `Email Me When New Matches are Created by Other Users`.

7. Optionally update information about the team. If entered this information will be displayed publicly on the Internet.

8. Click `Save`.

8.1.1 Use of the Result Center

Use of the Orion's Result Center is included with Orion's annual license fee.

Result Center may be used with any hosted Orion match. This includes either sanctioned events with the Civilian Marksmanship Program or USA Shooting, non-sanctioned events, or a team's daily practice.

8.1.2 Disabling the Result Center

Using the Result Center is completely optional. If at any point a user should wish to disable the service he or she can simply log on to http://www.orionscoringsystem.comwww.orionscorings click on `Result Center Settings` and disable the service.

Disabling the service will remove Orion's ability to upload results. All previously uploaded results will no longer be available.

8.2 Listing Matches on the Result Center

8.2.1 Enabling the Result Center for a match

To list a match on the Result Center, and later to upload scores to the Result Center enable the feature from within Match Properties.

1. Click on `Match` and then `Match Properties`. Click on the `Result Center` tab.

2. Check the `List and Report Scores Online` checkbox.

3. Optionally, complete the `Contact Information` for the match. At a minimum entering the `zip code` is recommended.

4. Click `Save`.

   After clicking `Save` Orion will try to communicate with Result Center. If there is any communication problems (e.g. a network is unavailable) Orion will return an error. If no error is returned, the match was successfully created on the Result Center.

The `Contact Information` fields are optional. Any fields filled out will be visible on Result Center to the public. To make a match visible to other shooters and coaches and encourage participation these fields should be completed. If the competition is closed to outside participants do not complete the information.

8.2.2 Removing a Match from the Result Center

To remove a match from the Result Center:

1. Click on `Match` and then `Match Properties`. Click on the `Result Center` tab.
2. Uncheck the `List and Report Scores Online` checkbox.
3. Click `Save`.

8.2.3 Uploading Results to the Result Center

Once the Result Center is turned on for the match, Orion will automatically upload results periodically to Result Center.

Results may be manually uploaded by going to `Result Center` in the menu bar, and then `Upload Results`.

8.3 Tournaments

A Tournament is simply a group of Matches. Tournaments allow users to organize matches online, allowing athletes and spectators to more easily find related competitions. For example, a state 4-H competition may create a tournament to group together their Air Rifle match, Air Pistol match, Silhouette match, and Shotgun match.

8.3.1 Creating a Tournament

To create a tournament:

1. Click on `Result Center` and then `Create a New Tournament`.
2. The tournament name is required, all other fields are optional.
3. Specify which other Orion clubs can add matches to the tournament.
4. Click `Save`.

8.3.2 Tournament Permissions

Tournaments are a group of Matches. When a Tournament is created, you as the creator of the Tournament, always has permission to add or remove matches to that Tournament. Also as the creator, you may specify other Orion users to add their matches to the Tournament.

Granting a club permission to add their matches to your tournament is done in the Tournament Properties box. Visit Editing a Tournament (section 8.3.4) for more imformation.

Only Orion for Clubs and Orion Scorecard users may be given permission to add a match to a Tournament. Orion at Home users can not create Tournaments or add Matches to a Tournament.

8.3.3 Adding or Removing a Match from a Tournament

Adding or removing a Match from a Tournament is done from the specified Match's Match Properties. A Match may be members of more than one Tournament.

To add or remove a Match from a Tournament:

1. Open the Match in Orion.
2. Open Match Properties.
3. Click on `Result Center`.
4. If it is not already checked, enable `List and Report Scores Online`.
5. In the `Tournaments` list box, check next to each Tournament to join, or uncheck Tournaments to be removed from.
6. Click `Save`.

8.3.4 Editing a Tournament

To edit a tournament, including removing a tournament from the Result Center:

1. Click on `Result Center` and then `Edit an Existing Tournament`.
2. Select the Tournament to edit.
3. The Tournament Properties box opens. Make any necessary changes to the Tournament's information.
4. Click `Save`.

Only Tournaments who's end date is in the future, or within 60 days can be edited.

8.4 Team Leagues

8.5 Additional Result Center Features

8.5.1 Individual Score Page

The individual score page lists the scores fired by a single competitor in the match. It graphicaly displays the 10 shot series shot groups, as well as lists the scores for each event, stage, and shot.

To open an individual score page, for any athlete in the match, simply click on the athlete's name from within the Result Center.

8.5.2 Scoreboard

The Result Center Scoreboard is intended to be projected on range during the competition, using a projector or large screen television. The Scoreboard ranks athletes and teams by average shot fired based on the avaliable score. Scoreboard alternates between the most important results and will continuously scroll through the top athletes and teams.

To open the Scoreboard, click on the `Scoreboard` link found on each Match Page within Result Center. To display the Scoreboard on range we recommend opening your browswer in full screen. Check with your browser's documentation to learn how to do this.

Appendix A

Manual Scanning of Targets

A.1 Independently Scanning and Scoring Targets

Orion's Auto-Score technology will perform all necessary steps to scan and score a target. In some instances it may be advantageous to perform the steps auto-score does independently. When using an unsupported scanner, for example, auto-score may not work.

To independently score targets follow the steps listed below:

- Scan targets with the scanner.
- Load target images into Orion.
- Score targets.

Shooter's Technology can not provide assistance using an unsupported scanner to scan target images. It is the end user's responsibility to know how to correctly configure and operate the scanner.

A.1.1 Scanning Targets

In order for targets to be scored by Orion they must be scanned in with certain resolution, color, size, and file type. Check the scanner's documentation to learn how to scan targets with the following settings.

- 300 DPI (dots per inch)
- 24 bit color
- Set the paper size consistent with the target being scanned
- Saved as JPEG (.jpg extensions) or TIFF (.tif extensions) image file at the highest possible quality

Target images must be also be saved to the Match Image Directory. See Section 5.5.2 for more information.

Each target image must have a unique file name.

A.1.2 Loading Target Images

Once Orion targets have been scanned and saved in the match image directory the target image files must be loaded into Orion. To load target images either click the `Load Images` button or `Match`, then `Score`, then `Load Images` from the menu bar.

Loading target images take about one seconds per target. Orion is performing preprocessing on the image, and trying to read the target identifier barcode. If target identifier barcodes were used, Orion will automatically assign the target to the correct shooter (see Section 5.8.2).

When targets are first loaded they are highlighted in green. This simply means the target has not yet been scored.

Click the plus sign (`[+]`) next to `Targets`, on the `Match Scoring` tab, to see the list of imported targets.

Orion will only load new targets from the match image directory. Any target previously read by Orion will not be re-loaded. Furthermore Orion will not load any image from the target image directory that is not a target.

The user may add new targets to the image directory and load new targets images multiple times during a match.

Appendix B

Using Orion Scorecards

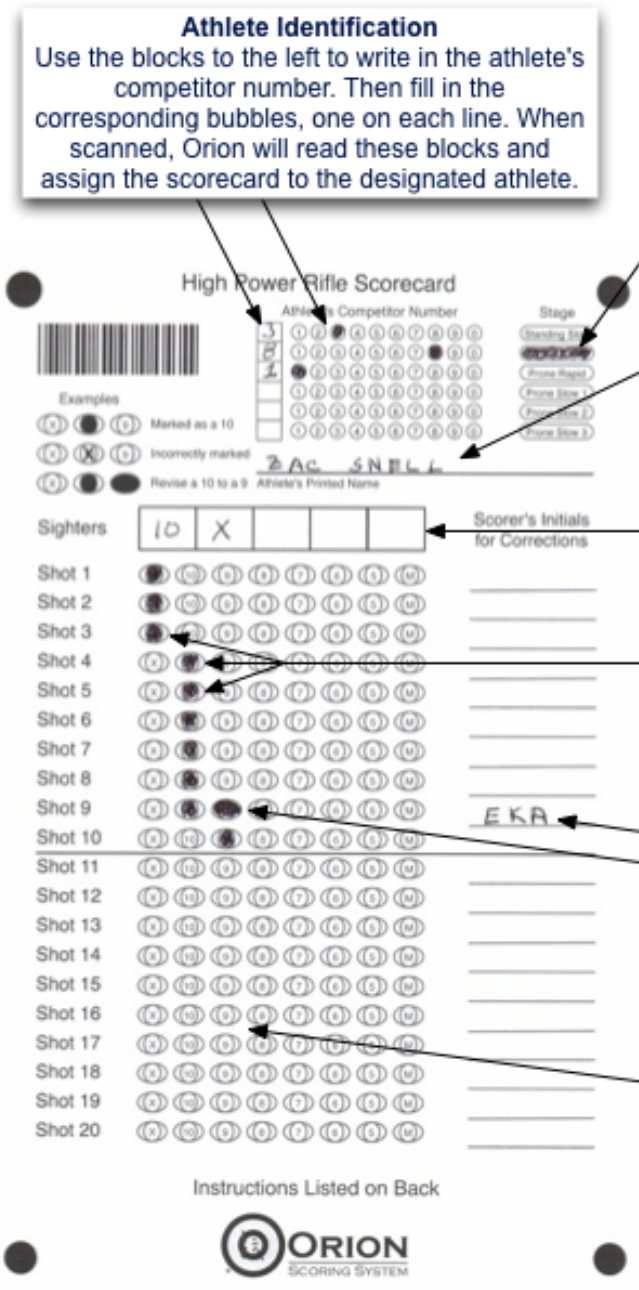
Orion's scannable scorecard technology is intended for disciplines such as high power rifle, silhouette, or shotgun. In these disciplines the target is physically impossible to scan, but there is an existing well known method of scoring in the field. With Orion Scorecards scorers fill in bubbles corresponding to the athlete's score on each shot. Later the statistical officer scans the scorecards which gets interpreted quickly and accurately by Orion. Match results are available online in just a few seconds.

For the scorers and athletes using Orion scorecards is not difficult. But as Orion scorecards are different from what they are used to it does take some education. The information graphics below provide all the instructions scorers and athletes need to successfully use Orion scorecards.

How to Use Orion Scorecards

Front of Scorecard

Use only a blue ink pen, black ink pen, or permanent marker (e.g. sharpie).



Athlete Identification
Use the blocks to the left to write in the athlete's competitor number. Then fill in the corresponding bubbles, one on each line. When scanned, Orion will read these blocks and assign the scorecard to the designated athlete.

The examples provided use Orion's High Power Rifle Scorecard and NRA High Power rule references. While specifics differ for each discipline, the instructions are valid for all Orion scorecards.

Stage Identification
Fill in the appropriate stage bubble. If no stage is selected Orion will, by default, assume the first stage in the list.

Athlete's Name
Write the athlete's name legibly. If the competitor number can not be identified the stat officer will assign the scorecard manually based on the name.

Sighters
Write in the value of each sighter shot, if any. Orion does not read these values; they are for the athlete's reference only.

Shot Values
Each line represents a different shot. There is one bubble for each possible shot value, including Xs and Misses (M). Fill in the *inner* bubble representing the shot's score.

Changing a Shot Value
By rule (NRA HP 14.16) if a shot value has to be corrected, leave the original mark. On the scorecard fill in the complete *outer* bubble of the correct score, then initial to the right.

Complete for Fired Shots Only
Orion scorecards may have more shot value fields than actual shots in a stage. Only fill in a shot values for shots in the match. If, in this example, there are only 10 shots in rapid fire sitting, leave shots 11 - 20 blank.

Do Not Make Extra Marks
Extraneous marks or doodles on the scorecard may cause Orion to mis-interpret scores. It is best not to make any additional marks.

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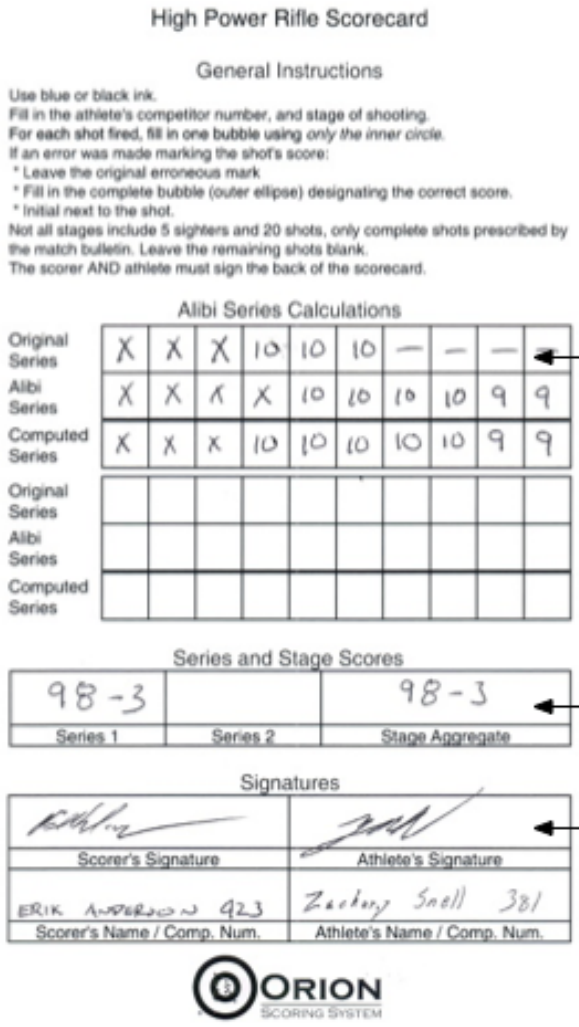
How to Use Orion Scorecards
Back of Scorecard

The back of each Orion scorecard is for the athlete's, scorer's, and stat officer's use only. Orion does not scan the back of the scorecard; only the information on the front of the scorecard is read by Orion.



High Power Rifle Scorecard

General Instructions

Use blue or black ink.
Fill in the athlete's competitor number, and stage of shooting.
For each shot fired, fill in one bubble using *only the inner circle*.
If an error was made marking the shot's score:
* Leave the original erroneous mark.
* Fill in the complete bubble (outer ellipse) designating the correct score.
* Initial next to the shot.
Not all stages include 5 sighters and 20 shots, only complete shots prescribed by the match bulletin. Leave the remaining shots blank.
The scorer AND athlete must sign the back of the scorecard.

Alibi Series Calculations

Original Series	X	X	X	10	10	10	—	—	—	—
Alibi Series	X	X	X	X	10	10	10	10	9	9
Computed Series	X	X	X	10	10	10	10	10	9	9
Original Series										
Alibi Series										
Computed Series										

Series and Stage Scores

Series 1	Series 2	Stage Aggregate
98-3		98-3

Signatures

Scorer's Signature	Athlete's Signature
ERIK ANDERSON 923	Zachary Snell 381
Scorer's Name / Comp. Num.	Athlete's Name / Comp. Num.

ORION SCORING SYSTEM

Alibi Calculations
On certain scorecards space is provided to record and calculate alibi values. Orion will not calculate the alibi scores for you, the scorer is responsible for knowing the appropriate rules and adjudicating correctly (e.g. NRA HP 10.10). Once calculated, transfer the final scores to the front of the scorecard.

Series and Stage Scores
The scorer should calculate and record the series and stage score for the athlete (NRA HP 14.3.1 f-1). Orion does not read this information, only the score values on the front of the scorecard matters to Orion. The series and stage scores are for the athlete's reference only.

Signatures
To be official the scorer and athlete must sign the scorecard (NRA HP 14.3.1 f-2&3).

ORION SCORING SYSTEM

Orion scorecards are available for high power rifle, rimfire sporter, shotgun, and silhouette. For more information on Orion or Orion scorecards visit www.orionscoringsystem.com. Results from Orion scored matches are available at www.orionresults.com.